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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLXI No. 3114.] LONDON, JANUARY 17, 1923. [75th Year. Price 1s.

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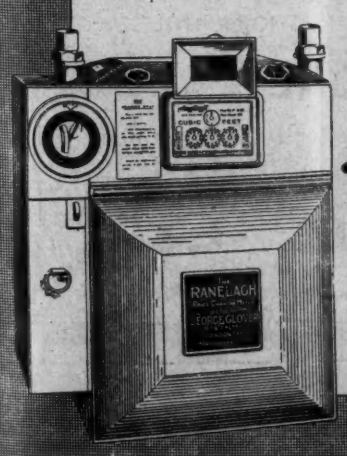

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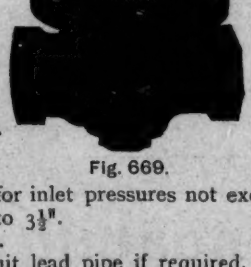

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VOL. CLXI., No. 3114.] WEDNESDAY, JANUARY 17, 1923. [75TH YEAR.

EDITORIAL NOTES.

The Inquiry and the Period of Transition.

THROUGH the mists which lately and so largely filled the lay mind as to increases in gas accounts and their relation to the therm system, the Committee who are inquiring into the matter are penetrating. There is ample evidence of this in the pertinent questions which Sir Clarendon Hyde and his colleagues put to the witnesses, and in the incidental remarks which they make. For example, referring to the public complaints as to the introduction of the therm, Sir Clarendon, at the last sitting, observed that he believed the Committee had formed the opinion that they were due to want of explanation of the system to the public, and that simultaneously in some cases the price of gas had had to be raised. It seems to us that the whole matter, as the result of the investigation, is being whittled down to very fine points. This is particularly patent as the inquiry develops. The third day's evidence strongly emphasizes a previous impression—that placing of gas supply on a more systematic basis, and one which will allow gas undertakings to operate to the best advantage in whatever are the current economic circumstances, is more or less a revolutionary proceeding, and a very proper one having regard to the future; but, notwithstanding, many people fail to recognize, or are unprepared to acknowledge, that there must be a period of transition. The Gas Regulation Act established new conditions, and imposed new safeguards; but the conditions of gas supply were at the time precisely as they had been formed and left by the old legislative régime, but worsened by the conditions of wartime and after. The inappreciation as to the need of a substantial transition period in such circumstances is especially manifest in the evidence given on behalf of the railway companies. They seem to expect that, when an Order is issued under section 1 of the Act, all the safeguards provided should at once come into play. It is really a big thing that is in hand. A beginning has to be made; and time must be allowed to develop to the perfect state of safeguards, &c., which the Act provides. Already the objects of the Act are maturing, in that the returns of calorific power and pressures are showing a greater uniformity than of old; and what is more, in no place where the therm system is in operation are the consumers paying for incombustibles.

On the third day of the inquiry, there was not a single witness opposed to the therm system of supplying and charging for gas. The evidence of Mr. J. Triffitt and Mr. W. C. Goodchild for the railway companies was that the system is satisfactory, and therefore should be retained. We cannot imagine concerns like railway companies, with their dealings with numerous gas undertakings, saying anything else; for a therm is a therm all along the line, and comparisons of charge for potential thermal value are easy as between town and town. But there came the complaint from the railway representatives that better safeguards are necessary in respect both of calorific power and pressure. They asserted that the Gas Regulation Act is not being complied with in these respects. There was no acknowledgment by them that time in these matters is as necessary as would be the case in laying a new railway track from one end of the country to the other. They want recording calorimeters established. Of course, they do. So does the gas industry. But before a vast expenditure is incurred in this respect, the Board of Trade, the Gas Referees, and the gas industry desire, and so should every consumer, that an efficient instrument be assured; and on this the Gas Referees have been working diligently. They believe they have reached the goal; but a practical time-test is necessary. And it is, as Prof. Cobb says, a wise policy for the Referees not to act prematurely in this matter. As to pressure, it has to remembered that the railway companies constitute an exceptional case; they do not represent the ordinary run of consumers and gas users. Thus it is that the railway companies would put onerous conditions on gas suppliers in respect of pressure. But this is an old polemical question. It has been the subject of a separate inquiry, and has been dealt with by the Board of Trade, and provision made for higher pressures than 2 inches in mains of not less than 2 inches, should the declared value fall below a given figure. If there are great fluctuations of pressure below the minimum 2 inches under the prescribed conditions, then complaint should be made to the local authorities responsible for the testing; and if pressure testings are only made at the gas-works (which is not the case in London and many other places), then there are statutory ways and means of getting this altered on proof of the incompatibility of the test with the statutory requirement as to minimum pressure. The Gas Referees are not at all dissatisfied with the way local authorities are taking-up their responsibilities in this matter of testing; but here again time must be permitted for making all the necessary changes. Complaint, too, was made as to the great difference of pressure as between day and night, which is a matter that affects not the ordinary consumers but railway companies practically alone, and yet their complaint is not evidenced by the street-lamps of a good many cities and towns of which we have knowledge. The reference by one witness to a night pressure of 7-10ths must apply, if the undertaking is working under the Gas Regulation Act, to an isolated case; and the attention of the local authority should be called to it.

In this connection, there was strong advocacy of the use of governors on each service-pipe. The railway companies in this respect are seeking in their own fashion for an ideal condition of things; but governors are only useful in providing for the maintenance of a level pressure at the points where they are fixed, always assuming there is an excess of pressure on the inlet side of the governor. But Mr. D. Milne Watson, Prof. J. W. Cobb, and Dr. Harold Hartley all showed that very much what the governor does can be accomplished by the gas-tap at each point of consumption. In fact, the evidence of Dr. Hartley showed that a fairly large change in pressure does not make any marked difference to the efficiency of heating appliances. There is, of course, not the slightest objection to consumers having governors fixed at their own expense; but it can hardly be expected that gas undertakings could make this provision universally—for example, as Mr. Milne Watson showed, the provision of governors on the prepayment supplies alone of his Company would mean an expenditure of approximately £1,200,000. It must not be forgotten, too, that the major part of the gas-heating appliances in use are hired from gas undertakings, who have considerable organizations for their inspection and maintenance, and all these appliances are regulated to the local conditions of supply from the time of fixing onwards. So far as lighting is concerned, there are burner maintenance schemes in operation in many undertakings. But the best possible control is that afforded by the instruction of consumers; and much is being done almost everywhere in this direction. It is gratifying to find how solicitous some people outside are to teach the industry its own business. We are not opposed to such interest; but the unfortunate thing is that the tendered advice is not as a rule overweighted with practical considerations. This governor question is an instance; and the suggestion as to

their application comes from a source of custom the conditions of which are not by any means representative of those generally obtaining in relation to domestic and industrial supply. Closely allied to the subject of pressure and governing is that of the adjustment of fittings upon changes of calorific power. Prof. Cobb and Dr. Hartley both showed that there can be fairly considerable changes in calorific value per cubic foot which can be dealt with by means of the gas-tap and the air-regulator. Prof. Cobb mentioned as an illustration 450 to 550 B.Th.U., which gives a range in variation of 100 B.Th.U. which can be dealt with by the simple means mentioned. Dr. Hartley supplied some statistical information which indicated how little alteration in efficiency there is with different appliances with a largely varying consumption of B.Th.U. per hour, and in the case of a boiling-burner with changes in pressure running between 15-10ths and 40-10ths.

As already said, there was not a single witness who had anything to say against the therm as the basis of charge. Mr. Stanley H. Jones has not found any complaint regarding it in the district of the Commercial Gas Company. Alderman F. S. Phillips, of Salford, described the system (though it has not been adopted there) as absolutely fair; and the President of the Institution of Gas Engineers (Mr. J. D. Smith, of Belfast), also representing a municipal concern, has no doubt whatever as to its being a perfectly satisfactory system. The London County Council, the Sheffield Gas Consumers' Association, and the Railway Companies' Association profess no grievance whatever against the therm as a basis of charge. The Chairman of the Committee showed how circular-letters to the number of 102 had been issued to borough and district councils regarding the inquiry; but there had only been fifty answers, and among these many did not desire to offer evidence, nor did several Chambers of Commerce. There is no rush to criticize or to furnish adverse testimony—in fact, all the silly newspaper talk about the therm and its influence on gas accounts is through the inquiry having ridicule heaped upon it. The "Daily Mail" must be feeling very cold in its isolation over this matter; and it cannot be at all comfortable now that it sees that what was a "mystery" to it was nothing of the kind to important public bodies and organizations representing large consumers.

There is only one matter arising from it all that has any real importance attaching to it—the standard or maximum prices which have been granted. The London County Council have called attention to the question as to whether the altered economic circumstances do not call for further revision. But any revision that could be made in any case would be of such modest order that it would make an inappreciable difference to the consumers where the sliding-scale is in operation. The railway companies' witnesses had much to say about the manner in which standard prices have been determined under the Act. But the Board of Trade are not responsible for the lines of determination. They are defined by the Act. The point the railway companies make is that the Board have no authority (as they should have) to review pre-existing standards or maximum prices; but they have to take them whether good or bad, and add to them a figure representing the ascertained increased costs of working. It is submitted by the railway companies that what ought to have been done (which would have been an impossibility in most cases) is to ascertain the cost of production per therm, say, in 1913, and then add to that the figure representing increased costs—in other words, the railway companies would have set the Board of Trade the task of reviewing past decisions of Parliament, as well as to ascertain the increased cost of manufacture. Had this been the duty imposed on the Board, we cannot imagine when the therm system would have been finally established. Further evidence will be taken by the Committee next Tuesday.

The Problem of the Small Works.

THE Director of Gas Administration (Mr. H. C. Honey), in his evidence on the first day of the Departmental Inquiry into the system of supplying gas by the therm, told the gas industry very plainly that it was its duty under the Gas Regulation Act to devise means of raising the efficiency of the smaller gas undertakings. It seems that there has been complaint that the Act hardly deals fairly with this class of works, in that, standing alone, they cannot afford the necessary technical advice and supervision which is available to the larger concerns, and which is requisite under the Act. In that statement a reason for a continued low efficiency, and therefore a public disadvantage, comes into direct conflict with what Mr. Honey describes as the "deliberate policy" of the Act; and he suggested that gas undertakings must find means by amalgamation, by joint control, or by some other method of pooling resources, whereby this state of things will be altered. In what Mr. Honey had to say, there is the assertion of a fairly considerable inefficiency in respect of the smaller undertakings; but at the same time he offered constructive suggestion, which points to two courses being open to those concerns to improve their own conditions, and to render better service to the public. One course is for them to consider themselves no longer the pariahs of the industry, but to bestir themselves to secure the professional aid that is open to them to effect better results, or to throw-in their lot with a larger undertaking the resources of which enable them to produce economies which the smaller undertakings have been unable to realize in the circumstances of a restricted, isolated, and struggling existence. It must not be overlooked, too, that if the economic conditions of the larger undertakings have depreciated as the result of the upheaval of eight years or more ago, those of the smaller concerns have been brought to an even worse state.

In an article in this issue, Mr. G. M. Gill discusses this problem of the small works. He shows how the smaller works occupy numerically an important place in the industry; and he indicates, too, that there is an enormous aggregate waste going on through the methods by which many of these small works are administered and managed. From this both the undertakings and the consumers suffer. It is not, however, suggested that small magnitude of manufacturing operations and business alone implies inefficiency; but nevertheless the circumstances, and the price at which gas has to be retailed, are sufficient evidence of a waste which offers wide scope for reclamation and therefore improvement for both the undertakings and the public. Until an analysis of the gas undertakings of the country in relation to output is made, one has a vague notion as to the number of small concerns there are. At some pains in respect of research, Mr. Gill has classified the undertakings of England and Wales (without taking count of those in Scotland and Ireland) in relation to output, and finds that, out of 1173 concerns, there are no less than 640 in operation with outputs below 30 million c.ft. per annum, and another 276 with outputs between 100 and 30 millions—leaving only 257 with outputs between 100 millions and the (in 1921) 33,443,596,000 c.ft. make of the Gas Light and Coke Company. It is the 640 and the 276, together 916, that represent the problem of the small works in the matter of higher efficiency; for in 1921 the respective average prices of those two groups were 7s. 6d. and 5s. 10½d. per 1000 c.ft. of gas of x quality.

These price averages may have changed somewhat for the better since the close of 1921; but they tell a tale, and that vividly. The 7s. 6d. average for the 640 undertakings is neither the maximum nor the minimum. The nearer one approaches the minimum, the better the efficiency; the more the average is exceeded, the greater the inefficiency. The 7s. 6d. covers qualities of gas differing considerably; and it is a very fair test and evidence of administration and management not being on the most economical lines. We know from general consideration that this must be so. In the article Mr. Gill supplies sufficient information as to the causes which produce the effects that are disadvantageous to undertaking and consumers alike. There is insufficient information available regarding the purchase and qualities of coal and other materials; and cost per ton delivered at the small gas-works in outlying places is very burdensome. It is for such works to be assured that they get in respect of coal the very best value for the money spent. Our contributor, too, has met with cases in which there is wasteful procedure in respect of the heating of retorts, which means that there is very little surplus coke for sale. There are also losses in other secondary products; and very little is known as to the quality of the gas that is being made, with the result that excessive and disuniform calorific power means great loss. If, in a works that is operating under the therm system, gas is being made that is upwards of 100 B.Th.U. higher than the declared value (and Mr. Gill says he has met with this in more than one case, and even in a medium sized works he has come across gas 40 B.Th.U. in excess), this tells a tale of inadequate supervision and control.

Under the therm system, in such cases, B.Th.U. are being supplied for which there should be direct payment. There is no doubt the B.Th.U. are being paid for, but in a high charge per therm calculated on the declared value, while the price per therm might be proportionately reduced were it not for the surplus quality. Moreover, it is not an advantage to the consumers to be supplied with widely varying calorific powers. These are only instances of the channels of loss; but they are sufficient to show that, if the owners of these small concerns took the necessary steps to obtain expert supervision over their manufacturing and business operations generally, the money expended in this way would be recovered from present waste, and a profit be made from the same quarter to the advantage of both the undertaking and the consumers.

This is a point that requires to be emphasized, in considering how greater efficiency is to be brought to bear upon the fortunes of small gas undertakings. Mr. Gill suggests three courses: The acquisition by larger neighbouring undertakings of a controlling interest in the smaller concerns. We doubt whether gas undertakings could do this without statutory authority. Anyway, if it could be done, undertakings having a controlling interest would see to it that efficient operation was brought to bear in the protection of their interests. The second course would be to shut-down the small works, and to purchase gas in bulk from a larger neighbouring undertaking. This is a comparatively simple matter in these days of steel mains and boosting plants; and so schemes can be readily devised and carried out. Then there is the periodical inspection and supervision of the operations of small works by a competent expert. The first two schemes would take time; this one would not. Many small undertakings that are working without competent supervision would find it a sound policy to enter without delay into such an arrangement. Never was economical operation more requisite than now in all parts of the industry; and this applies with fullness to those undertakings upon which the economic conditions of the times act with full weight and severity. And this altogether apart from the more exacting conditions of supply that are imposed, and properly so, by the Gas Regulation Act, which will no doubt in time be applied to all gas undertakings.

Interference with Industry and the Commonweal.

LEGISLATIVE and departmental interference with industry and the commonweal is a subject on which Prof. H. E. Armstrong, F.R.S., has been delivering himself; and it is a nice study in the futile satire of which he appears to be a perfect master. He inveighs against everything that does not conform with his views, and against everybody who does not do as he himself thinks best. His thorough belief in himself, and the low valuation he places upon the intelligence of many others, project from almost every sentence. Probably a little introspection would be good for the learned Professor. "To-day," he says, "there are few whose "opinion is of value on any vital problem—we prefer to "consider problems of purely commercial value, instead of "those of health and life. Hence my lone tears; for as yet "I have found no one to weep openly with me." Why not? Is intelligence so dead that there is no one left, save Prof. Armstrong, capable of discrimination? Or is intelligence so alive that the diatribes of the Professor have a proper value placed upon them, and so are ineffective in drawing followers? That in one particular matter he sheds his tears alone is eloquent testimony to the fact that his subject and his methods of presenting it gain no sympathizers. In his present deliverance, there is much attack, and little that is constructive. All are wrong who endeavour to do something in respect of the promotion of smoke abatement. No one does anything correctly in relation to it; and no one is right but the owner of the one idea that the only panacea is low-temperature carbonization, and the production of a smokeless solid fuel. That a smokeless fuel—even a solid fuel—can be produced by any other means appears to be beyond his comprehension.

We gather from the deliverance that the Ministry of Health has shown misdirected zeal, and so has at least one other Government Department. Science is accused of doing nothing to rid us of the smoke nuisance; it is only measuring it. The Committee appointed to consider the matter was technically unqualified in the main; and their sparse constructive proposals found no embodiment in the Bill that was introduced into Parliament as a result of their labours. With this we are able to agree with the Professor. The Committee themselves, he asserts, took little constructive evidence; and this related to the use of gas and to central heating. Smokeless, easily combustible solid fuel was considered only on two occasions; but no scientific evidence was given on the subject. The task was beyond the Committee; they had no proper scientific outlook, and therefore made no use of scientific methods. A great opportunity was missed of displaying to the public the case for a smokeless solid fuel—a case free from partisan advocacy. Why was not Prof. Armstrong there? Is he such a distinguished partisan of smokeless solid fuel as to disqualify him from being counted free from prejudiced advocacy? Anyway he should not have allowed the opportunity to be missed. But apparently he did; and so, though others are in his eyes blameworthy, he is himself not free from reproach. But though so much is alleged by him as to the mistakes of others through incompetence, he declares that private persons who, though technically utterly incompetent for the task, and always unsystematic in their ways, have struggled on doggedly, and have at last won through in the matter of low-temperature carbonization, and the production of a smokeless solid fuel. This is strange. It is the negation of all the principles which give supremacy to the chemist and the engineer, and which principles Prof. Armstrong holds so dear. But he qualifies the good report as to the ultimate success of the tenacity of those who have "won through" in the matter of low-temperature carbonization. "Given efficient co-operation of chemist and engi- "neer and systematic study, the problem would have been "solved years ago." But they have had the co-operation of chemists and engineers; and those who are alive, and have been professionally engaged in the work, will take it to heart that, had it not been for their (this is the only inference to be drawn from Prof. Armstrong's words) inefficiency, much time and money would have been saved in realizing the solution.

Apparently, too, the scientific advisers, and staff chemists, physicists, and engineers, of the Fuel Research Board are also incompetent; for "the information that has emanated "from this august body is also worthless for all practical "purposes." But here is Prof. Armstrong ready to teach them their business, as he has tried to teach the gas industry theirs. The business of the Board, we read, should be not to undertake work even of academic value, but to aim at practical results, and to help, by honest co-operation with all the agencies in sight, to secure the result which, on all hands, is accepted to be that of greatest industrial importance in the life of our nation—the production of a suitable smokeless fuel at an economic price. The experience of the gas industry is that this is precisely what the Board are doing. As a matter of fact, there is something to be said as to the value of competent independent investigation. But, according to the Professor, there is no present prospect that the Board will contribute to rendering our cities clean and clear, and at the same time economize coal. The Board—this is very wicked and injudicious of them—work in secret, and take no cognizance of outside knowledge; and they seem to have no practical outlook. Even the chemists of the gas industry have perforce greatly neglected the fuel problem; their place has been usurped by the engineer, and by one of very narrow outlook. But we are buoyed-up. There is now a more amiable regard for the gas industry on the part of Prof. Armstrong than there has been for some years. He has hopes for it. "Ere "long the gas industry will be ranked one of the first of "chemical industries, and the fascination of the problems "it presents clearly recognized. The gas-works chemist "must soon be fully in evidence; he must be a whole one." This is the one bright ray amid a mass of invective and grumbling; and the latter is not ended. We read that as not even the patronage of H.M. Fuel Research Board has been able to secure public belief in the therm, a Committee of five has been appointed by the Board of Trade to inquire into the complaints that have been raised. "Of course, as "usual, the Committee consists of men who have no know- "ledge of the subject they are to consider. Consequently, "they will have no feeling for it, and will necessarily accept "the view most alluringly put before them. In the end "the public will not be enlightened."

This is all very Armstrongian, and nothing else. Not a single thing appears to be done correctly; and yet those who attempt to do things obviously do not take this critic into their counsels. Why is it?

Gas Output Statistics.

THE statistics regarding the gas business in the United States, which were published in our "Miscellaneous News" columns last week, are particularly interesting. It will be noticed from them that the total quantity of gas manufactured in the States in 1921 was 332,554,600,000 c.ft., to which has to be added 27,837,000,000 c.ft. of natural gas, which was purchased and mixed with the manufactured gas for public use. The two figures make 360,391,600,000 c.ft. A point which arrests attention is that of this total more than one-half (or 206,352,000,000 c.ft.) was carburetted water gas This means that an average of 57·25 p.ct. of the total gas distributed in 1921 in the United States was carburetted water gas. The opponents of water gas in this country, and those who are so much agitated over gas containing such a valuable heating constituent as carbon monoxide, should note this average, and compare it with the much lower percentage normally distributed in this country. The average, however, obscures the fact that in some places in the States neat water gas is distributed, while in others the proportion is well below the 57·25 p.ct. The average of water gas in Great Britain and Ireland for statutory undertakings is only between 17 and 18 p.ct.; but, of course, this includes the undertakings which do not make it. Another interesting figure is the estimated average consumption per meter in the United States. It was in 1921 35,190 c.ft.; the statutory gas undertakings in this country in 1920 showed an average per consumer of 31,566 c.ft. But in the States the calorific power is generally higher, so that their average per meter is intrinsically better than ours, despite the large vogue of electric lighting. This indicates the considerable development of domestic uses other than lighting. Of the sales of gas in 1921 in the States, it is estimated that 18·5 p.ct. was sold for illumination, 56·71 for other domestic purposes, 21·62 p.ct. for industrial applications, and 3·17 p.ct. for other unclassified uses. The *per capita* consumption in the States in 1921 is estimated at 3053 c.ft.; while, taking the statutory undertakings in Great Britain and Ireland, and the population based on the last census, the consumption *per capita* was 5110 c.ft. If the gas sales of the non-statutory concerns were added, the average *per capita* would be better still. As it is, the average of 5110 c ft. is better by 264 c.ft. per head of the population than when we made a similar calculation at the end of August, 1921.

Education in Industry and Commerce.

THIS is a subject which has our complete sympathy, as it must have of all men who take an active interest in the genuinely essential affairs of life, and the well-being of the community. Therefore, it is a pleasure to call attention to the work which is being undertaken by the Association for Education in Industry and Commerce—a member of the Executive Committee of which is Mrs. M. A. Cloudesley Brereton. The Association lately held a meeting at University College under the presidency of Sir Archibald Denny, Bart.; and the report of the proceedings is to us highly encouraging, as it shows a progressiveness in industry and commerce on precisely right lines. We believe in equality of opportunity in industry and commerce for all men; for, given the opportunity through educational facilities, the best ability will rise to the top, to the advantage of industry and commerce, and therefore of the country generally. We can find no room for regard for those who oppose better educational facilities for the workers, on the ground that they will "grow too big for their boots." This argument is the evidence of a very narrow appreciation that there is no equality in mental equipment in any section of our social system, and that in all sections there are superior mental equipment and latent talents that (as Prof. Schofield said at the meeting) await discovery among the workers, just as among the other grades of employees. This can only be done by giving all opportunities for educational improvement, which develops not only personality and character, but knowledge which is useful to the concern or the business in which the workers are engaged. This applies to all grades of workers—from the artizan to the labourer. Higher education (particularly in relation to the technical character of the work upon which one is engaged) is the creator of a higher efficiency, which is—it may be said, almost unconsciously—brought to bear upon the operations to the advantage of all concerned. The more intellectual a man in the right directions, the more valuable he must be to his employer. This cannot be gainsaid; and therefore the reverse also holds good. We have said "in the right directions," because we have known men of very high intellectual attainments who would never make their mark in either industry or commerce. Therefore, in considering the relationship of education to industry and commerce, especially in connection with the workers, one has to have regard first to general education, and then to special education and training to fit them for their vocations and the available positions. The provision of better educational facilities by employers is therefore a good business proposition—in fact, there is a moral responsibility in the matter, as well as material gain.

The work that is being done in this direction by firms and companies who are members of the Association was well illustrated in a paper by Mr. R. W. Ferguson, B.Sc., Hon. Secretary of the Association, and Educational Organizer to Cadbury Bros., Ltd. Industrial depression, it seems, has had a repressing influence upon the progress of the work; but now is the time for a resumption of activity with the revival of trade. But there are many firms who have carried on without a break through their ardent belief in the efficacy of the work. For apprentices, successful day continuation schools are often conducted in conjunction with the local educational authorities—the apprentices attending school for so many hours a week, and receiving time pay. The problem of the new employee is being dealt with by initiation schools and by works preparatory schools. We are naturally interested in two schemes for the training of apprentices, which were described by Mr. Ferguson. One refers to the scheme at the engineering works of Messrs. W. H. Allen & Co., of Bedford, and the other that of the Gas Light and Coke Company. The scheme of the former embraces both post-graduate and pre-graduate, as well as paid apprentices. The essential features of this scheme are: (1) The pupils and apprentices attend classes at the works school in the works time from four to eight hours a week. (2) The practical instruction in the works is provided entirely on production; but in some cases, particularly in the machine shops, certain sections are specially set apart for the special training of the younger apprentices. (3) All pupils pass through the laboratory, and in the case of the senior pupils assist in the research work undertaken there. The whole of the training is under the direction of the head of the education department, who directs both the practical and theoretical instruction. In this way complete co-operation is obtained between the shops and the works classes, and pupils and apprentices are encouraged to correlate their workshop and classroom experiences. As to the Gas Light and Coke Company, they have for the past fifteen years had a scheme of education for their technical-commercial staff, and for the men engaged in the installation and maintenance of gas appliances on the district. Boys to the number of twenty-four are selected annually from candidates leaving school, and are put through a six years' apprenticeship. They are taught partly in special shops erected for the purpose, partly by working with skilled fitters on the district, and partly at the Westminster Technical Institute of the London County Council. They are paid wages throughout their apprenticeship, and are given time in business hours for continuative education in English, mathematics, and drawing. The older men are trained for promotion to the staff, and for higher positions on the staff, by means of lectures and demonstrations. Annual examinations are held; and students are also encouraged to enter for the examinations held by the City and Guilds of London Institute. Mentioned also is the fact that before the gas industry there is now the scheme devised in collaboration with the Board of Education for the training and examination of men for technical positions in gas undertakings, regarding which scheme we have recently published several articles and reports.

The paper by Mr. Ferguson covered a much larger area than we can treat upon here—such as the training of employees of widely varying ages, including adults, with the view to giving them all a better outlook and greater opportunities. The training of salesmen, too, was not overlooked. Altogether, the report of the proceedings will give satisfaction to all who believe in the existence of an inseparable bond between education and industrial and commercial efficiency and progress. We can heartily commend to the consideration of all employers identified with the gas industry the work of an Association possessing such high ideals and aims.

Why not Extend the Inquiry?

The inquiry which is now being held by the Departmental Committee into the therm system had its origin in the high gas bills complaint of a comparatively small minority of gas consumers. Perhaps it would assist to a proper understanding of the matter (though we do not for a moment suppose the idea will be carried out) if the Committee extended their investigation with the view of ascertaining why there has been no complaint from the majority of gas consumers, who find they have nothing to grumble about. Why those who complain should alone receive the attentions of a Departmental Committee, it is difficult to see. Those who have not been troubled under the therm system with accounts which they have not regarded as excessive ought surely to have the causes of their contentment examined.

Therm Gas Accounts.

A correspondent writes to say that the present fuss about the form of gas accounts is all very funny and silly. One would, he thinks, imagine from it that the administrators of gas companies did not know how to conduct their own business, and how to give satisfaction to their consumers. The information that comes to us week by week shows quite a number of companies with accounts incorporating the much-approved plan of giving cubic feet consumptions with the therm equivalent upon which the charge is based. We have an account from Wandsworth which supplies all the particulars that were found in the Sheffield and Maidstone accounts (referred to last week on pp. 77, 78), together with the Gas Referees' report, as follows: "The Gas Referees appointed under the Gas Regulation Act, 1920, certify that the Wandsworth, Wimbledon, and Epsom District Gas Company has fulfilled its statutory obligations in respect of the gas supplied by it throughout its district during the quarter ended Sept. 30, 1922. The average calorific value supplied was 479·7 B.Th.U., which is 9·7 above the declared value."

Correspondents' Objections.

There will probably always be objectors to selling by quality instead of by volume; and, on the other hand, there will continue to be a vast belief in those objectors being wrong. People are getting better educated in this matter. They are learning that they are buying a definite quantity of heat by paying on the therm system; and this they never knew before. They can make better comparison of prices, too, than previously as between one gas district and another. This is why we do not like the suggested method of charge put forward by Mr. Edwin Upton in our "Correspondence" columns last week. It would perpetuate the 1000 c.ft. charge; and few would have any regard for the guaranteed heat content. We like the Maidstone and the Wandsworth method much better, which does all that Mr. Upton suggests, and more, because it maintains the supremacy of the system of purchase by quality. We are not so convinced of the limited intelligence of the public as Mr. Upton appears to be, when he says that "probably not 1 p.ct. of gas consumers will ever be able to think or reason in terms of therms." As time progresses, they will be able to think and reason better in terms of therms than they have ever been able to do in terms of cubic feet; and they will know actually which undertakings are supplying them with the cheapest gas. At this time of day, the majority of them have a very poor knowledge as to what is a cubic foot. From Mr. Upton's letter and that by Mr. Cunnington (also published last week), it seems that there is some doubt as to what Mr. Higham meant by "stated" quality. Both correspondents regard the expression as having the same significance as "declared" quality. Our idea on reading Mr. Higham's letter was that he intended "stated" to represent what has hitherto been known as a "standard" quality. Mr. Cunnington also says that in our issue of Jan. 3 we said that "accounts are likely to be rendered in future with the alternative of the cubic feet charge." We do not remember those words. What we did say was that "the rendering of accounts with the data as to cubic feet and therm consumption combined appears to be more prevalent than was known a short time ago, and will, we believe, become common practice now," as, for example, in the illustrations already given in the "JOURNAL." The first portion of the final paragraph of Mr. Cunnington's letter is a mere quibble. As to the latter part, our correspondent must discuss that with the Director of Gas Administration in view of his evidence as to what would probably happen if the therm system of charging was withdrawn.

Coal Prices.

The Advisory Committee of the Mines Department have reported on the question of the costs of coal, having regard to the price to the consumer. The lines of their investigation were: Expenses of production, railway transport, and handling and distribution. So far as pithead prices go, a reduction, in the opinion of the Committee, rests entirely upon an increased demand, with a consequential enlargement of output, and a diminution of overhead charges. But this can only follow gradually upon a general recovery of the trade and industry of this and other countries. While the Committee believe that reductions both in transport and distribution charges are overdue, they fear that the margin between pithead price and actual price to the consumer will in the present circumstances of transport and distribution remain substantial. As to pithead costs, the Committee state that, according to the latest information available, the average cost of producing a ton of coal at the pit in August last was 16s. 10½d., as compared with an average of 9s. 4d. in 1913. Of the former figure, 11s. 1½d. was wages, as compared with 6s. 10½d. in 1913. According to information furnished by the joint auditors under the National Wages Agreement, the average earnings for all classes of workers in the mining industry for August, 1922, were 9s. 2½d. per shift. In June, 1914, they were 6s. 5½d., so that in August last there was an increase of about 42 p.ct. on pre-war earnings.

An Analysis of Increases.

The Committee give an analysis of the average increases in pithead prices of the chief qualities of coal as compared with the pre-war figures. From this it appears that household coal shows increases for the better qualities ranging from 110 to 120 p.ct., for medium qualities from 80 to 120 p.ct., and for the lower grades from 70 to 100 p.ct. Gas coal exhibits increases varying from 75 to 90 p.ct. For locomotive coal, the average prices paid at the pit by eleven railway companies in August, 1922, show increases varying from 50 to 86 p.ct. over the corresponding figures for 1913. For other industrial coal, the average prices at the pit in August, 1922, show increases ranging from 30 to 50 p.ct. on the pre-war figures. The analysis indicates that while the average selling price of all coal at the pit in August, 1922, was about 64 p.ct. higher than in 1913, it was much greater for household coal and the better kinds used by gas-works than for coal consumed by railways and for other industrial purposes.

No Immediate Prospect of a Reduction.

Under present conditions, therefore, the Committee have come to the conclusion that we cannot look for an immediate lowering of the average pit-price of coal. At the same time they recognize that present prices cannot, with the current costs of production, give an adequate return either to the coal owners or to the coal miners. The situation is undoubtedly a grave one; and the Committee believe that relief will only be found in an increased demand for coal, with consequent fuller employment at the pits. It is, in the main, to an enlarged industrial demand that we must look for a reduction in the costs of production and an improvement in the financial position of the coal trade.

Transport Charges.

This is where the Committee are of opinion that something more might be done to bring down the cost of coal to the consumer. As to railway rates, the average freight rate on all kinds of coal, coke, and patent fuel carried by railways in Great Britain during August, 1922, was 3s. 9d. per ton, against 2s. per ton in 1914—the increase being about 88 p.ct. Generally speaking, wagon hire charges are 100 p.ct. in advance of pre-war rates for coal carried in railway-owned or colliery-owned wagons. Concerning dock dues, the information is that the charges at the ports levied on coal for shipment are exceptionally heavy, particularly in some districts, compared with 1914. Serious consideration has been given to the question of the cost of coal transport from the pit. It forms a substantial portion of the total cost of coal to the consumer; and the Committee are of opinion that further reductions in the rates must be effected as early as possible if the contribution which the coal industry has already made towards the revival of trade generally is to have full effect. In the opinion of the reporters, the flat rate should be removed; and there should be a further reduction in the percentage increase and in the wagon-hire charges.

PERSONAL.

At a meeting of the Institution of Civil Engineers on the 19th ult., Mr. GEORGE EVETTS, of Palace Chambers, Bridge Street, S.W., and Mr. T. S. F. GIBSON, of the South Metropolitan Gas Company, Old Kent Road, were transferred from the class of associate members to that of members.

Alderman JOSEPH CALVERT, who was included in the New Year's list of Knights, has been on the Middlesbrough Town Council for twenty years, and Chairman of the Gas and Electricity Committee since 1910. To the application of his business training to the matter of gas supply Middlesbrough in no small measure owes her present excellent position in the matter of cheapness and efficiency.

Mr. R. SEYMOUR TOBEY, who has been chosen by the Directors of the Horley District Gas Company to fill a vacancy on the Board, should prove of much value to the undertaking in this capacity, for he had nearly twenty years' experience as Secretary and Engineer to the Company before he resigned to take up another position.

The Barrow Town Council have unanimously approved the recommendation of the Gas and Water Committee that Mr. CLAUDE DIAMOND be appointed Gas and Water Works Manager at an inclusive salary of £550 per annum. In reply to a question, Alderman A. Brown (the Chairman of the Committee) said there had been no consideration of a separation of the positions. The two departments had always been combined, and there had been no difficulty about it. Councillor Jamieson declared that salaries paid to gas managers in other towns of the same size were £250 above the salary paid in Barrow.

Mr. JOHN MORRIS WEISS, until recently Director of Development of the Barrett Company, and Mr. CHARLES RAYMOND DOWNS, formerly Chief Chemist of the Barrett Company, and more recently engaged in special plant-development work at the Buffalo works of the National Aniline and Chemical Company, have formed a partnership as consulting chemists and chemical engineers, under the name of Messrs. Weiss and Downs. They have taken an office in the Chemists' Building, at No. 50, East 41st Street, New York City, and will shortly have laboratory facilities available there. Both of them are known for their many inventions in the fields of coal-tar products, synthetic organic chemicals, and catalysis. Recently they received an award of the Howard H. Potts Gold Medal from the Franklin Institute, for the production of maleic acid by the catalytic oxidation of benzene.

Mr. ROBERT RITCHIE, of Thornhill, Dumfriesshire, is now Manager at the Lochgilphead Gas-Works.

Mr. JOHN GARDNER, a Director of the Kirkham Gas Company for many years, has been appointed Chairman in succession to the late Mr. Rich. Ward.

OBITUARY.

The death has occurred, at Mentone, of Mrs. Gertrude Lloyds the wife of Alderman J. H. LLOYD, the Chairman of the Birmingham Corporation Gas Committee, a Director of Messrs. Stewart, and Lloyds, Ltd., and a former Lord Mayor of Birmingham. Mrs. Lloyd died suddenly after a short illness.

The death is announced, at the age of 83 years, of Dr. GEORGE LUNGE, who passed away at Zurich on the 3rd inst. He had lived for half-a-century at Zurich, where he had held the Professorship of Chemical Technology at the Polytechnic. Some of his earlier years were, however, spent in the chemical district of the Tyne. So far as the gas industry in particular is concerned, Dr. Lunge's name is perhaps best known in connection with standard books on coal tar and ammonia, and sulphuric acid and alkali manufacture.

The Gas Industry and Publicity.—At the annual convention of the Pacific Coast Gas Association, the Publicity Committee presented a report (signed by the Chairman, Mr. Frederick S. Myrtle, and other members) in which, after quoting an inquiry by a gas investor as to whether he would do well to dispose of his securities, they said: There is deep significance in this inquiry. The significance to us of the gas industry is that we are still inclined to hide our light under a bushel basket. Why not, through complete co-operation and intelligent direction, make the story of the gas industry so well known that there will not be any question in the mind of the public as to its soundness, its necessity, its future existence, its economy, its thousand uses and great convenience? While we are lying dormant, the virtues of other fuels are being made known to the public in plain language. Ours is one of the greatest industries in the United States. In fact, in respect to gross operations, it is the fourth of the four great industries of this country, and it is a business that the public know little about when one conceives its magnitude. Collective effort, central control, a co-operative publicity campaign, could be more economically handled than through present methods of advertising, and would carry the message to the public and pave the way to greater efforts, and, what is equally important, to a better understanding of our business on the part of the public.

GAS.*

Notes for Teachers.

We have received for review the second and revised edition of "Gas: Manufacture, Distribution, and Use," compiled and published by the British Commercial Gas Association, primarily as an aid to teachers, to which end the subject-matter is set out as a series of lessons, and includes explanatory drawings suitable for reproduction on the blackboard. While the clarity of explanation and the simplicity of much of the matter involved render the notes admirably suitable for this primary object—instruction of all grades of pupils—the compilation as a whole forms a reliable elementary text-book for use in the gas industry itself, and as such is probably well-known to our readers.

The introduction points out that an endeavour has been made in this second edition to correct any statements that are no longer up-to-date, to express a few points more clearly, and to increase the scientific value of the lessons by the addition of some new matter. As to the latter objective, the most notable alteration is the substitution of a lesson on "Governors" for that on "Gas Pressure," and the treatment of the latter important subject in a new appendix.

The gas industry as a whole will be keenly interested and satisfied to learn that the "B.C.G.A." are distributing this useful text-book among the reference libraries of the Press, in the hope that it may be "of service to some journalists as a reference book at the present juncture." A printed slip is enclosed which indicates such sections as are deemed "likely to contain facts useful to those journalists who may not be scientists but who may be called upon to comment on what is a highly complicated and scientific problem." We sincerely hope that the therm inquiry now sitting will mark the passing of the "present juncture," and that the evidence forthcoming and the eventual finding of the Committee will receive careful study from the Press and the public, and result in the vindication of the gas industry's morals and of the much maligned therm. We unhesitatingly give as our opinion that if such an informative book as the one under review had been studied by those responsible for Press commentaries on the gas industry's subtleties, the knowledge so gained would have been as oil on troubled waters, and the industry's passage would have been the easier. To anyone who was more or less conversant with the true facts of the case, the representations of the Press and the unversed beliefs of the general public were perhaps the most painful part of the therm and the carbon monoxide controversies; and it was astonishing to notice how stiff-necked ignorance was regularly tolerated in the columns of even our most respectable newspapers. Among the sections to which the attention of journalists is called, we notice especially those on the composition of gas, on smoke abatement, on testing, on the meter, and the appendix on the therm. The paragraph on the protection of the consumer might perhaps be specially commended; and the new appendix on pressure provides useful knowledge. We trust our confrères of the general Press will accept the book in the spirit in which it is given—the spirit of public service—and make good use of it. The "B.C.G.A." are to be congratulated.

* "Teachers' Notes for Lessons on Gas," with Blackboard Illustrations. Second and revised edition, 1922. Compiled and published by the British Commercial Gas Association, of No. 30, Grosvenor Gardens, S.W. 1.

MIDLANDS DISTRICT GAS SALESMEN'S CIRCLE.

The first meeting of the recently formed Gas Salesmen's Circle for the Midlands District was held in Birmingham last Wednesday, when Mr. R. J. Rogers (the Chairman) presided over a large attendance representing some thirty to forty gas undertakings. Rules were adopted, on the lines of those already published in connection with similar Circles.

The Chairman thereafter delivered an address, in which he dealt with the objects at which the Circle would aim, and emphasized the need for good discussions at the meetings. He said that, since the suggestion was made to institute these Circles, he had been surprised to find that in a few cases engineers in charge of gas undertakings in that district had questioned the advisability of gas salesmen meeting in the manner proposed by the rules; but up to the present he had been unable to find any legitimate reason for this "lukewarm" attitude. The attendance of a salesman one half-day per month at the meetings must, in his opinion, prove beneficial both to the salesman and to the undertaking he represented. The fundamental principles underlying the endeavours of the Circle would be to give greater service than ever to the gas-consuming public, by promoting efficiency among gas salesmen, and at the same time bring greater prosperity to the gas undertakings.

Mr. A. Hammond, of Coventry, opened a discussion on "Hiring Systems," drawing attention to the policy recently adopted by his Committee of fixing gas-fires on simple hire terms.

Before the delegates proceeded to inspect the showrooms and stores of the Birmingham Gas Department, the Chairman made the announcement that, coincident with the "B.C.G.A." annual conference in Birmingham in the autumn, it was proposed to hold a National Gas Exhibition.

An extended report of the meeting will be included in the next issue of the "Gas Salesman."

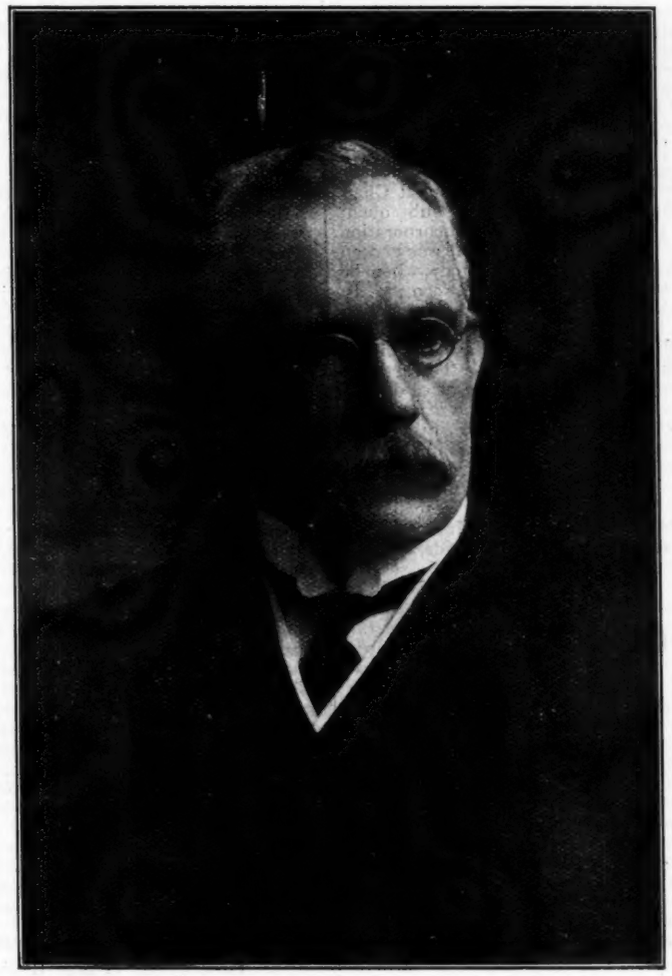
JAMES WILLIAM HELPS.

FROM our midst has gone JAMES WILLIAM HELPS, erstwhile energetic worker for the gas industry, the friend of all in it. Through ill-health for some years (since his resignation of the office of Engineer and General Manager of the Croydon Gas Company) he has been living more or less in retirement—seen rarely by his old professional associates, but always keenly interested in their activities, and the progressive work and fortunes generally of the industry. Last Saturday night saw him in his customary latter-day state of health; but on Sunday morning heart failure resulted in his sudden passing.

Our sorrow is keen; so will be that of many others. Many memories of a long friendship, of happy days, of much work together, of long journeyings in connection with the industry's affairs, jostle each other as we rapidly glance over the years during which he was a prominent figure in the professional ranks, and in the activities of the industry. His work for the industry was of a purely unselfish order. He was for a great number of years on the platform, and before the footlights. He had a right to be there; for no man was ever more fitted than he for the work that he undertook in the cause of the industry's commonweal. And what is more, he was kept there by popular choice and approval. Not only was he an unselfish worker, personally unsparing, but he had endowments which enabled him to serve with ability and effectively, and this in a manner which endeared him to his colleagues. There was sagacity, perspicacity, a cultured mind, and that well-known grace and courtesy which was inseparable from him in those days before the final break in health came.

In his official life, he was the trusted friend of Directors and staff, and revered by the workmen. He showed great fidelity to the interests entrusted to him; and those interests embraced his men. As an Engineer and Manager, he stood in the front rank. We all wish that health and strength had permitted the continuance of the work for which he had such manifold qualifications; for not till it ceased did one recognize the void that such an event would cause.

He will be laid to rest on Thursday. Outside the grave, those memories to which we have referred will live long. Sincere and profound will be the sympathy that will pass from near and far to Mrs. Helps and the family.



Born in July, 1855, our late friend was the son of Mr. G. W. Helps, who for a great many years was Secretary of the Bath Gas Company. After being educated at the Bath Grammar School, and serving his articles with Messrs. Stothert and Pitt (a firm of engineers in that city), Mr. James Helps entered the service of the Bath Gas Company as an Assistant in 1875, but left after a year to become principal Assistant to Mr. Henry Woodall, at that time Chief Engineer of the Leeds Corporation Gas Department. He remained at Leeds until 1880, when he was appointed Engineer and Manager of the Weston-super-Mare Gas Company. His next and most important move took place four years later, when he was successful in obtaining the position of Engineer and Manager of the Croydon Gas Company. The retirement, as from Dec. 31, 1901, of the then Secretary (Mr. W. J. Russell) led to some staff changes, and Mr. Helps was appointed Engineer and General Manager. During the period between 1884 and 1903 he put his whole heart and soul into the work of the Company; but then came a breakdown, which necessitated a complete change and rest from work for a considerable period. Externally he was as strong as ever; but he was suffering from a nervous collapse. The Directors insisted upon his taking three months' leave, and he visited India. His return was made the occasion of a hearty welcome by the whole of the staff and workmen of the Company, who, to show their esteem and respect, presented him with a silver inkstand, an oak roll-top desk, and an illuminated address. The Chairman of the Company (Mr. Charles Hussey, J.P.), in welcoming Mr. Helps, stated how pleased they were to see him among them again once more, having returned well in health. Some years later his health again gave him trouble; and at the meeting in February, 1911, reference was made to his absence—the first meeting he had missed—from this cause. Once more he went away for change and rest, and visited Spain and Tangiers, after which there was a temporary improvement. During the next year, however, he once more had to go away. This time he went on a voyage to South Africa, and returned better, but was advised to take a course of baths at Aix-la-Chapelle, which he did. Unfortunately, however, in the following year he was compelled by ill-health to retire from his position, after having spent in the Company's service 29 years, which was exactly one-half of his

life up to that time. On his retirement his valuable services to the Company were recognized by the grant of a suitable allowance. He was succeeded as Engineer by Mr. Archibald Caddick, who had been his Chief Assistant.

Under Mr. Helps's management, the sale of gas by the Croydon Company increased enormously, and many additions and extensions were made to the works—illustrated accounts of which will be found in back volumes of the "JOURNAL." In fact, they have been for many years what might fairly be termed a "show works." They were visited by some of the Continental gas engineers who came over to this country at the time of the Earl's Court Gas Exhibition, by the members of the Institution of Gas Engineers (in 1910, when Mr. Helps was President), by the members of the German Association of Gas and Water Engineers, by the Junior Institution of Engineers, and by the London and Southern District Junior Gas Association; and on each occasion the attention of the visitors was called to the changes which had been effected in the works. Under Mr. Helps's management co-partnership was introduced, just at the time when he had reached his twenty-fifth year with the Company.

It can truthfully be said of Mr. Helps that he never refused any assistance he was able to give to anyone or any organization in connection with the industry to which he had devoted his life's work. So kindly was his nature and so broad was his mind that he never tired of working for the "good of the cause" and the encouragement particularly of the younger members of the profession. Thus it is not surprising that his friends were legion. He was admitted into the British Association of Gas Managers while at Leeds in 1879, and in due course passed into the Gas Institute, but later left it to join the new, and separate, Incorporated Institution of Gas Engineers, of the Council of which he became a member in 1894, and occupied the Presidential Chair in 1900. He did a large share to bring about the subsequent amalgamation of the two organizations; and on the incorporation of the present Institution of Gas Engineers in 1902 he was chosen as Hon. Secretary, which position he held until 1907, when he was elected Vice-President, becoming President in 1909-10. In 1905 he was presented with the Birmingham medal in recognition of his lifelong services to the industry. He was a member of the Refractory Materials Committee and the Emergency Committee, and was one of the nominees of the Institution on the Advisory Committee on the Livesey Professorship of Coal Gas and Fuel Industries at the Leeds University. His resignation of the last-named position was announced at a Council meeting of the Institution in November, 1914, when a vote of thanks was passed to him in recognition of the services he had rendered in that capacity. Mr. Helps was also an Honorary President of the International Congress of the Gas Industry held in Paris in 1900. He represented the Institution of Gas Engineers on the International Commission for the Standardization of Screw Threads, and reported upon the subject at the 1909 meeting.

In other directions, he was closely connected with the Southern Association of Gas Engineers and Managers, of which he became Hon. Secretary in 1888—a year later undertaking, in addition, the duties of Hon. Treasurer. These positions he held until towards the end of 1905, when he felt unable longer to carry on the work. Much earlier than this (in 1893) the members had shown their keen appreciation of Mr. Helps's great services by presenting him with a handsome gold watch. He was President of the Southern Association in 1897; and during his year of office the secretarial duties were performed by his brother, Mr. Douglas H. Helps, who is Engineer to the Reading Gas Company. He was also a member, and on the Committee, of the old South-West of England District Association of Gas Managers. Into the Institution of Civil Engineers Mr. Helps was admitted an associate member in 1889; and in March, 1900, he was transferred to the class of member. He was also a Fellow of the Chemical Society.

The year 1904 was a memorable one in Mr. Helps's career. This was the year of the Earl's Court Gas Exhibition; and he was chosen by the Institution of Gas Engineers as Chairman of the Advisory Committee to supervise the arrangements and generally organize the exhibition. At its close, he was presented with a piano, "to show the personal esteem of the visitors for him, and to form a perpetual reminder of how much they appreciated his efforts and labour on their behalf as the chief working representative of the gas profession at the exhibition." He also acted as Hon. Secretary of the Gas Engineering Committee of the Franco-British Exhibition at Shepherd's Bush in 1908, and was presented by the members with a pair of silver candelabra, as a token of their well-merited appreciation of the work done by him in that capacity. Just a year after the opening of the Earl's Court Exhibition, the Croydon Gas Company themselves inaugurated a very effective display in the Drill Hall at Caterham, the arrangements for which were carried out by Mr. W. J. Sandeman, who is Distribution Engineer to the Company.

Outside the gas industry, Mr. Helps was also active. He took a great interest in technical education at Croydon, and was Chairman of the Croydon County Polytechnic and the Croydon Literary and Scientific Institution. As a result of pressure from various quarters, he consented in 1902 to enter into a contest for the representation of the West Ward of the Croydon Borough Council; and his popularity among his townsfolk was manifested by his success on this occasion. Always fond of athletics, he was in his time both an enthusiastic cricketer and an expert swimmer. In the latter connection, a gratifying incident may be recalled. In 1891, at the annual meeting of the Croydon Football Club, Mr. Helps was presented with the certificate and medal of the Royal Humane Society, awarded to him for "saving two young women in 20 ft. of water, and 200 yards from the shore, at Eastbourne." He was boating at the time, when another boat, containing two young ladies, capsized. Placing his sculls in the boat, Mr. Helps at once jumped into the water (leaving his little son alone in the boat), and swam to the rescue of the ladies.

Mr. Helps was twice married, and two sons followed him into the gas industry. Mr. Reginald A. Helps, who was at one time with Mr. H. Morris at Jersey, was later for a period at Croydon; while Mr. A. S. Helps is Manager and Secretary to the Chippenham Gas Company. His brother is Mr. Douglas H. Helps, of Reading.

The funeral service will be at Shirley Church to-morrow (Thursday) afternoon at 3 o'clock. For the convenience of those desiring to attend, it may be mentioned that Shirley Church is about two miles from East Croydon Station.

DIGEST OF PATENT CASES.

A number of points relating to patent law are dealt with in the digest of cases reported in 1922, edited by Mr. F. G. Underhay, M.A., Barrister-at-Law, and issued as a supplement to the "Illustrated Official Journal (Patents)." In one case, an extension of a patent for four years was granted, for loss owing to hostilities, though the patent had been worked exclusively outside the United Kingdom—a satisfactory explanation being given. In various other instances, extensions were allowed for different terms, owing to losses caused by the war.

In connection with an action for infringement, the defendants, not having taken what was held to be an essential part of the invention claimed, were declared not to have committed a breach of an injunction which had previously been granted against infringement. An interlocutory injunction restraining him from infringing a patent by selling an article below authorized prices was granted against a person who held a pedlar's licence, but also had a small shop. Each article bore a notice that it must not be sold below the price fixed by the patentee. Defendant bought the articles from private houses and re-sold them second-hand at prices which were below the fixed prices. There was a case in which a claim in the specification of a patent applied for in 1920, under special war legislation, and corresponding to a United States patent of 1914, was held not to be good ground for the revocation of a patent applied for in 1915; and it was declared that a special reference to it ought not to be ordered. The amendment made by the Act of 1919 had not made the patent liable to revocation on any grounds more extensive than those on which it had been liable to be refused.

In connection with two patents which were held to have subject-matter, with regard to one it was declared that the inventor had discovered and utilized a new principle, and to have shown practical methods embodying it and putting it into operation in the combination which he had claimed; while the other was held not to be merely for the use of a well-known apparatus in a different way and for a different purpose, but for a particular combination, devised for a special purpose, of well-known mechanical appliances, which, though not in the abstract novel, was novel for the purpose for which it was used. One patent was held to be invalid on the ground of insufficiency of the description as to the manner of working the invention; and another case led to the finding that the fact that knowledge and skill (and even some experimental tests) are necessary in putting an invention into practice is not sufficient to invalidate a patent if the nature of the invention is adequately described.

Baltimore's Growth of Output.

It is stated by Mr. George Beadenkopf, the Chief Gas Engineer, that the increase in the gas output of the City of Baltimore Consolidated Company during the six years from 1917 has been practically as great as was the case in the hundred years from the incorporation of the Company in 1816 to 1916. Baltimore was the first city in America to introduce gas; and as early as 1846 it was sold there on the basis of so much per 100 c.ft. For the first twenty years of the Company's existence, no accurate records are obtainable showing the amount of gas used from year to year; but from that time, the business may be divided into periods. From 1836 to 1876 practically all gas was used for lighting exclusively; and the increase in annual output during these forty years was about 515 million c.ft.—an amount equivalent to seventeen days' output at the present time. From 1876 to 1890, when gas for cooking was coming to the front, electric light was growing, and the incandescent mantle was coming into vogue, the output increased some 827 million c.ft.—an amount equivalent to about twenty-seven days' output now. Then in the ten years from 1890 to 1900 gas was being pushed more for cooking, water heating, and heating purposes generally; and in this period the output increased 326 million c.ft.—equal to some ten days' output to-day. In the latest period—1900 to 1923—the use of gas has been further pushed for industrial purposes, cooking, and heating. As a matter of fact, in these twenty-three years the annual output increased about 7912 million c.ft., equivalent to fifteen times the growth during the forty years from 1836 to 1876.

ELECTRICITY SUPPLY MEMORANDA.

SOME of our electrical contemporaries have been reviewing the year 1922; and there is a marked absence of elation over the sum of achievement. There seem to have been two retarding influences—the Electricity Supply Act and industrial depression. The 1919 Act was of little use without the supplementary Act of last year. But if we may be allowed an opinion regarding the delay in the passing of the latter, we think it was a beneficial thing, as it gave electrical people opportunities to look at the proposals of the 1919 Act in more definite perspective, and to form clearer ideas as to the value of the revolutionary scheme of generation and distribution. Looking back to the Departmental reports that inaugurated this legislation, and to the almost boisterous reception the proposals then had from the electricity industry, the toning-down there has since been stands out in very emphatic contrast. The reviewers glance backwards. There have been districting, many inquiries, much verbosity, but nothing has yet matured. The industry is still loitering among the preliminaries. Bright spots in 1922 seem to the reviewers to be difficult of perception. Not even the passing of the supplementary Act is looked upon as an altogether good achievement. The "Electrician" confesses as much, when it remarks that the Act "was not after all a very great achievement, and it is still too early to count what harvest is likely to be gathered from it." There is gloomy thought in these words; and perhaps it is fully justified. The intentions of the Act are to pave the way to the financing of the schemes upon which the Electricity Commissioners are toiling under the great difficulty of an industry divided in respect of the particular policy laid down by the 1919 Act; but whether the intentions will be fulfilled, is a matter over which a cloud of doubt hangs. We cannot see a rush of local authorities desirous of borrowing money to lend to Joint Authorities over whose proceedings they have no complete control. It is as plain as anything can be that many are now looking for abortive results from the huge experiment, which a Government who at one time had vast ambitions pushed forward with an enthusiasm backed by prodigious ignorance.

A Disappointing Year.

Domestic Electrification.

However, those who look a little deeper find that there are in the past twelve months some causes for satisfaction. The year has largely cured the idea that the change that has been made—legislatively, if not materially—is going to cause electricity to flow into every village, and the current be supplied at a price that will make it available for all purposes, and cheaper than the ordinary fuels. Hereford has opened many eyes and shattered many hopes with its huge extravagance and its losses on countryside electrification. The Department finds it would have done better by staying at home. Perhaps for ratepayers generally it is well that the experiment has been limited in this fashion. As already said, industrially the year has been a gloomy one; and there has been much idle plant and therefore capital. Latterly, there has been a better demand for power purposes. With the revival of trade and manufacture, there is bound to be. But it has all shown how the industrial load will in future violently fluctuate. The electricity industry will more and more feel the effect of both the risings and fallings of trade, just as the gas industry feels more and more the risings and fallings of atmospheric temperatures. There is now quite a feverish anxiety to get hold of custom for electricity of a less flighty nature; and the cooking load in some electrical minds is the thing, with the use of electricity for water heating to supplement it—water heating for supplying a single bath a day! One can be sympathetic over the limitations in domestic electrification of the sister industry; and that sympathy can extend to the men whose vision only comprehends the revenue side of the business, and overlooks the technical disabilities. Cooking by electricity has been before the public for decades, but has not made much headway. Saturation mark is found a very little way beyond the initial stage of exploitation. But there are a few who are putting their shoulders to the wheel in this matter, and have gained encouragement—and publicity—by the connecting-up of a relatively small number of cookers. But it has been hard work. "Enterprise, hard work, and vision" have been required; and "optimism, unremitting labour, and courage" will have to be live characteristics in the future. This is not our view alone. It is that of the "Electrician;" and that paper, observant of need, ought to know. It says: "The enterprise, hard work, and vision of certain engineers have opened-up to the general view the possibilities of domestic electricity. To explore and develop these possibilities as they should be explored will require optimism, unremitting labour, and courage." So now we know. Electric cooking, water heating, and so forth have not such attractions that there will be a vast wave of adoption. Only "optimism, unremitting labour, and courage" will produce some effect. Will that effect be equal to the qualities referred to, and to the expenditure of money and work? However, through the reductions of the costs of coal, labour, and other materials, the past year saw a very general lowering of prices for current; but 1½d., 2d., and 2½d. per unit are still figures that constitute in many places the charges for heating purposes. How many people can afford such prices for 3420 B.Th.U., and an efficiency in use varying, according to purpose, from (say) 40 to 90 p.ct.? However, some men in the electricity industry have great expectations; and they hope for a rapid maturing. There is nothing like looking forward hopefully in a new year, even if in the event it winds-up with regret over non-fulfilment.

Ugly Electric Appliances.

"Electrical Industries" has been having a grumble over the ugliness of domestic electric appliances. Electric light fittings, it says, now present the correct union of efficiency and grace. That sounds very nice. But there are many accessories, and especially many forms of electric heating apparatus, into which no element of æsthetic design has been allowed to intrude. Some electric fires, the writer says, are positively ugly, as if the maker had gone out of his way to provide the electric heater with a frame which would depress the user to the utmost. There are other things besides ugly exteriors that depress the user, and one of them is the account for the current consumed, unless he is exceptionally frugal with heat; and cold days do not encourage this. But it is, the writer says, no excuse for the ugliness to point out that "gas-fires and anthracite stoves are equally damned." There is no need to be abusive; but as to gas-fires, the writer must have been trying to inspect the windows of our gas-fire makers through glasses that distort the objects on view. He finds there are many electric appliances the frames of which belong to an orthodox style, but there is no harmony of purpose or outline between it and the electrical part. The result is a kind of mongrel, which one tolerates merely because it is "useful." He is afraid the makers have been too preoccupied over the electrical items and their mechanical supports, and have given only an eleventh-hour attention to the general design. They cannot have given even an eleventh-hour consideration to the general design. If they had, there surely ought not to have been so much ground for complaint of ugliness. However, appeal is made to the makers to try to do better. Why does not the critic present them with a few ideas?

To Stop Electricity Thefts.

Why it should be so, is not easy to explain; but there is always some satisfaction or consolation in knowing that other people are subjected to the same inconveniences and annoyances as oneself. An article by Mr. J. A. Reynolds has appeared in the "Electrical Review" on "The Theft of Electricity and Its Prevention." He tells us that in all probability no public service company suffers more severely from theft than an electricity supply company; it being, in his opinion, easier to steal electricity than water or gas. This may be true; but from the time gas-meters first came into use, there have been people who have found ready means for by-passing the meter by the friendly aid of a piece of indiarubber or other flexible tubing. Such cases, however, we think it may be said, have not grown numerically with the increase of the gas business. However, Mr. Reynolds has so little faith in human virtue, that he lays it down as axiomatic that, where it is possible and easy to steal, an enormous amount of theft will occur. The cheaper installation methods that are being adopted by some electricity concerns for the poorer classes of property are an aid, rather than a deterrent, to the propensity to steal current. In the country in which Mr. Reynolds is stationed, the small consumer, who is not only in the vast majority, but is likewise the worst offender, is unintentionally (presumably through cheap installation) afforded considerable facility to do what he is anxious to do—steal. This has led to the larger and wealthier companies installing meters; but this is deeply resented by the small consumers, and considerable ingenuity has been expended in devising means to prevent the proper functioning of these "objectionable instruments." This, Mr. Reynolds says, is only too easy in the majority of cases; and it is an established fact that a very large revenue is lost yearly to the electric light companies through thefts. The author then describes a system of prevention by a simple combination, manufactured by the Henley Telegraph Works Company, Ltd. We will not go into the details of this contrivance here; but the author states that three things are necessary to prevent thefts of current, and these have been attained in this combination. In the first place, access to the interior or "current" wire is impossible—at least without instant detection. Secondly, no pin or wire can possibly be pushed up into the current terminal, as a plate completely and closely covers it; and, thirdly, reversal of the leads outside will result in a dead earth.

An Electric Turbine "Bursts."

Even in the best regulated works of electric plant makers, electrical accidents happen. Seven persons were injured the other day by an explosion which occurred at the works of the General Electric Company, at Witton, Birmingham. An electrical turbine was under test, when it suddenly "burst," and pieces of broken parts were scattered about the room, and shot through the roof. The power house was set on fire; but the flames were speedily got under control. The men were injured by the falling parts of machinery; but only two sufficiently to require treatment at the hospital.

Reduction of Wages.

There has been much complaint regarding the high costs of electrical installation; and there has no doubt been gratification that the rates of wages of the men engaged on this work

have been further reduced. The information comes from the National Federated Electrical Association, and is the result of an agreement with the Electrical Trades Union. In accordance with this, the pay rates of all grades of workers have been reduced by a further 5 p.ct. on the 1921 rates (making a total reduction of 32 p.ct. on those rates). The reduction comes into effect on the first pay day following Sunday, Jan. 7, 1923, for the period covered by that pay day.

A WHITWORTH SOCIETY.

A well-attended gathering took place last Friday evening at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, to consider the formation of a Society of Whitworth Scholars and Exhibitioners. To the meeting all such scholars and exhibitioners were invited; and during the proceedings it was agreed that the Committee appointed should decide whether the Prizemen as well should be invited to join the Society which it was determined to create.

Born in Stockport in 1803, Sir Joseph Whitworth, Bart., D.C.L., LL.D., F.R.S., when thirty years of age started in business in Manchester as a tool maker, and won fame by working-out a system of gauges and screw-threads. In 1868, he presented to the nation the sum of £100,000 for the establishment of scholarships for the encouragement of practical science and mechanical art. He was an original member of the Institution of Mechanical Engineers, and for three years occupied the Presidential Chair.

Dr. H. S. Hele-Shaw, F.R.S. (the present President of the Institution of Mechanical Engineers), was voted to the chair at Friday's meeting; but he emphasized the fact that there was no intention whatever of making this matter a mechanical engineers' preserve. For the present, however, the Institution would give the new Society a committee-room and the use of their hall when it was required. There had, he said, been previous attempts to form a Whitworth Society; but the suggestion did not appear to have been received with any very great enthusiasm. It had been determined that, whatever was done, every Whitworth Scholar and Exhibitioner should have an equal voice in the Society. The London men would have no advantage over those scattered in other parts of the world. Just as there had been set up branches of that Institution all over the country, so it was hoped that the Whitworth Society would be widely spread. In this way they would not allow the name of that great engineer and benevolent man Whitworth, who had done so much for so many of them, to fade away. There was also another idea underlying the proposal —namely, that the older men might be able to help the younger generation of Whitworth Scholars. He read letters from a number of well-known men cordially supporting the movement.

The meeting unanimously decided to appoint a Provisional Committee to act on behalf of those present until the first annual meeting of the new Society. Dr. Hele-Shaw was chosen as the first President or Chairman of the Society, and Mr. E. R. Dolby to act as Hon. Secretary. The following were by ballot elected members of the Provisional Committee: Dr. Hele-Shaw (London), Sir Henry Fowler, K.B.E. (Derby), Dr. Arthur Morley (Board of Education), Prof. E. G. Coker, D Sc., F.R.S. (London), Prof. D. A. Low (Ilford), Prof. F. C. Lea, O.B.E., D.Sc. (Birmingham), Mr. E. R. Dolby (London), Mr. H. R. J. Burstall, M.B.E. (London), Mr. L. A. Legros, O.B.E. (London), and Dr. W. A. Scoble (Woolwich).

There was some discussion over the annual meeting; and it was determined that, as there was no need for a technical gathering, it should be made a convivial occasion. It will therefore take the form of a dinner to be held on Dec. 21 (when this does not fall on a Sunday), this being the anniversary of Sir Joseph's birth. It was, however, agreed that, as this date is so far off, the Committee should, if possible, arrange an inaugural dinner within the next two or three months.

It transpired that there had been great difficulty in obtaining the addresses of Whitworth Scholars; and one of the first things the Committee will take in hand will be in this connection. Any help that readers may be able to afford in this matter will be heartily appreciated. Another suggestion put forward for the Committee was that a record should be compiled of the names, careers, and work of Whitworth Scholars—to be called the "Whitworth Book."

There will be no necessity for anything more than a small subscription (to be fixed by the Committee); and no doubt all those who owe anything to Sir Joseph Whitworth's generosity in founding these scholarships, &c., will be only too anxious to associate themselves with the movement.

"B.C.G.A." District Conferences.—The first of a new series of British Commercial Gas Association District Conferences is to take place in the Assembly Room, City Hall, Cardiff, to-morrow (Thursday) afternoon, under the presidency of Mr. Charles E. Dovey, J.P., F.C.A. The question of public health has been selected as the main subject for discussion, having regard to the important part that gas plays in this matter. "Atmospheric Pollution in Relation to Health," will be dealt with by Mr. Ralph M. Picken, B.Sc., M.B., Medical Officer of Health at Cardiff; and "Public Health from the Architect's Point of View," by Mr. E. C. Morgan Willmott, A.R.I.B.A. In the evening, Dr. C. W. Saleeby, F.R.S. (Edin.), will lecture on "Life and Light."

THE FUTURE OF THE SMALL GAS-WORKS.

By G. M. GILL.

Giving evidence at the therm inquiry, Mr. H. C. Honey, the Director of Gas Administration (Board of Trade), put concisely into words a trend of thought which has undoubtedly been passing through the minds of many closely concerned with the management of small gas-works, since the passing of the Gas Regulation Act, 1920.

The reference is to Mr. Honey's comment that there was an objection from some of the smaller undertakings to the effect that the Gas Regulation Act required too high a degree of efficiency on their part to make it (the therm system) a fair method to them; and, as Mr. Honey stated, it was no doubt a fact that, unless an undertaking was very efficiently managed, it must, in order to avoid penalties, supply the consumer with a substantially higher quality of gas than it contracted to do. Therefore it would, for the time being at any rate, be supplying the customer with therms for which it was not able to make a charge.

Precisely what Mr. Honey suggests is undoubtedly taking place in many gas-works; and the writer has himself, in more than one works, noticed gas being supplied which was upwards of 100 B.Th.U. higher than the declared value; while in a works of medium size, where testing was regularly done, he was informed that it was necessary to maintain a quality of about 40 B.Th.U. above the declared value. The writer does not at all agree that any such substantial margin is necessary in works where the requisite testing apparatus and skill are available; but it is quite another matter in the very small works, where the working manager is one of the busiest men in the gas industry. He has to divide his time between charging and drawing retorts, clearing the hydraulic mains of thick tar, collecting gas accounts, canvassing for new supplies, and loading tar barrels, with many other and sundry duties to fill in the gaps in each 24 hours. How can such a man find time to test his gas as well? Already the price of gas is so high that such a company cannot contemplate the spending of any more money on additional help.

That is the position in many small works. As Mr. Honey puts it: "It was the deliberate policy of the Gas Regulation Act to increase the efficiency of the supply of gas; and the gas industry must find means—by amalgamations or a joint control, or by some other method of pooling resources—to increase the efficiency of those undertakings which, standing alone, cannot afford the technical advice and supervision which is available in the case of the larger concerns."

No one who understands the position of the small gas-works will dispute the soundness of Mr. Honey's conclusions. What, then, is the future of the small gas-works? Are there so many as to make the question one of real importance to the gas industry and the gas-consuming public?

The writer has been at some pains to analyze the number of gas undertakings of various sizes, divided into groups arranged in order of size. He has also averaged the prices charged for gas by each group. These have been taken from the "Gas World Year Book" for 1922, and are therefore based upon prices ruling in 1921, when charges for gas were at their highest point. These figures show the enormous preponderance of quite small undertakings; and the much higher prices charged by these is indicative of the difficulties under which they labour, and of the economies to be effected under some better form of control than that now in existence.

The particulars referred to are shown in the following table:

Number of Undertakings in England and Wales only.	Average Yearly Make in Millions Cubic Feet.	Average Price Charged per 1000 C.Ft.
		s. d.
33	Over 1000	4 8½
42	Under 1000 and over 500	4 10
58	,, 500 ,, 250	4 11½
124	,, 250 ,, 100	5 3
276	,, 100 ,, 30	5 10½
640	,, 30	7 6

N.B.—If Scotland and Ireland were included, the proportion of small undertakings would be materially increased.

It will be said that the price per 1000 c.ft. does not give a clear indication of the actual state of affairs. This, to some extent, is true; but while in each group there are undertakings supplying a relatively rich gas, there are others in the same group supplying low-grade gas, and so the law of averages comes into play to equalize within narrow limits the quality of gas supplied by each group, though there is an undoubted tendency for the smaller works to be supplying the richest gas. But little authoritative information is available upon this point.

The above table makes it perfectly clear that much higher prices are ruling for gas in those districts where small undertakings are operating; and those of us who know the difficulties of maintaining a uniform quality of gas, with all the assistance which the best testing apparatus and trained chemists can give, can well picture the sort of supply which must be inevitable where neither testing apparatus nor chemists are available.

In very small works where one setting may be at work, it is customary to shut down every night, except possibly in mid-winter, and to draw every retort—there may be no more than three—first thing in the morning; then charge one retort after the other, and fill up the holder. These retorts will then be drawn, not when the coal is carbonized, but when there is room in the holder for gas from one or more fresh charges. In these circumstances, filling the holder and fitting-in the retort-house work with the multitudinous other duties that one man has to do in a very small works, is far more important to the man in charge than the maintenance of any particular quality of gas.

There are many causes which operate to make gas expensive in such districts. The shutting down at night is most wasteful of fuel, and is one of the chief reasons that so little coke is sold per ton of coal carbonized. The charging of retorts with varying amounts of coal for varying periods is similarly wasteful.

The furnaces, where generators or regenerators are provided, are usually of a shallow type, and therefore dependent, if they are to be worked as producers, upon being kept moderately full of fuel, which can only be done if they are replenished every few hours. But this would interfere considerably with the other duties of the combined stoker and yard labourer; and so the furnace is filled first thing in the morning, in the afternoon, and again at night, which means that it is working as a producer for half the time, and as a direct fire for the remainder.

The charging of all retorts simultaneously causes loss of the best gas; there being too great a glut at one time for the plant to deal with, resulting in a poor yield of therms per ton of coal. When all the charges are spent, inert gas and air are admitted to spoil the good gas previously made. The exhauster—how good it can be in improving results, but how bad also!

In a small works coal is always expensive, for it is bought in relatively small quantities, and has to be carted from the station. As regards bye-products, it has already been explained how the coke produced is largely wasted, while the ammoniacal liquor recovered is too small in amount to enable anything useful to be done with it.

In the smaller works there is bound to be insufficient information in regard to the best materials to buy—such as retorts, bricks, pipes, plant and apparatus, oxide, meters, stoves, burners, and the great variety of other things used by gas undertakings. There is the great difficulty of deciding upon the right quality of gas to make, the maintenance of its uniformity, and the purchase and adjustment of the appliances to suit it.

All these are matters of considerable importance, and have a wide bearing on the price at which gas can be supplied, and the efficiency of the service given, upon which the prosperity of the business depends.

The settlement of the proper course to take in these and other matters requires experience and knowledge, which is not likely to be available for those administering small undertakings; but sufficient has been said to show there are reasons to account for the high prices charged for gas made on a very small scale. Some are inevitable, and some due to the reasons which Mr. Honey mentioned in his evidence at the therm inquiry.

There may now be defined the possibilities which lie before the directors and administrators of the small gas undertakings, if these are in the future to work more efficiently, to conform with the requirements of the Act, to supply cheaper gas, and to pay higher dividends. They may be summarized as follows:

(1) The purchase of the small undertaking by a larger one.
(2) The acquisition by a larger undertaking of a controlling interest in a smaller one.
(3) The shutting-down of the small works, and the purchase of gas in bulk from a neighbouring undertaking; or
(4) The periodical supervision of the small works and its working by a competent expert.

There may be other alternatives which do not readily occur to the writer; but the above suggestions at any rate are, it is hoped, worthy of serious consideration.

Some definite line of action as indicated above is undoubtedly overdue in the administration of many such undertakings; and should the therm inquiry have done nothing else, it has exposed, in an authoritative manner, their weakness under the operations of the Gas Regulation Act.

Gas-Works and Low-Temperature Carbonization.—In the course of a review of gas engineering in 1922. "The Engineer" says it is possible, but not altogether probable, that Sir George Beilby's suggestions in connection with the utilization of the gas obtained from the low-temperature carbonization process for admixture with town gas may some day be carried into effect. The prospect of the gas-works of the country becoming the centres of a smokeless fuel industry is attractive from a Utopian point of view; but the gas engineer conducts his present process with the knowledge that technically it approaches perfection, while commercially it is certainly capable of guaranteeing solvency. It cannot be denied that, in the able hands of the Director of Fuel Research, the technical difficulties associated with the production of semi-coke have largely disappeared; but the more serious unknown factor is the commercial abilities of the system. Products whose value is subject to wide fluctuation play so prominent a part in the process that it would appear to be one which might well alternate between prosperity and acute depression.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Haggerston Stove and Meter Works of the Gas Light and Coke Company.

The Stove and Meter Works in Laburnam Street, Haggerston, of the Gas Light and Coke Company (who also have a smaller station at Fulham) occupy a great deal of space, and embrace numberless different processes—as would be expected upon consideration of the operations carried on there. In the traversing of the former and the inspection of the latter, some seventy-five members of the Association spent a particularly busy time last Wednesday afternoon—assisted by untiring guides and a descriptive pamphlet which had been thoughtfully prepared for the purpose. On arrival, the visitors were cordially received by Mr. E. C. Holt (the Manager), and conducted round under his guidance and that of Messrs. F. S. Larkin (who occupies a similar position at the Fulham works), W. A. Harris, W. H. Ockleden, and J. A. Hough.

It has already been said that the works are large; but nothing about them is superfluous. On the contrary, extensions in various directions are looked forward to, for coping with the continually growing business. In the tour, a beginning was made with the extensive meter section; and here, as elsewhere, numerous ingenious devices were noted by the visitors. The scale of the work will be understood when it is mentioned that no less than 1500 meters of all sizes are dealt with weekly through the cleaning and paint-spraying shop. After thoroughly cleansing the cases, the paint is sprayed on under 45 lbs. pressure, on revolving tables fitted into bays; the atmosphere being cleared as far as practicable by the aid of an "Aerostyle" suction fan, driven by a 10½ B.H.P. gas-engine, which also drives the air compressor for the paint sprays. The testing of meters is carried out for the Company's information in accordance with the Sales of Gas Act. The test rooms are equipped with three pairs of 5 ft., thirteen pairs of 10 ft., and one 20 ft., test holders, capable of dealing with meters of all sizes from 18 c.ft. per hour up to 6000 c.ft. per hour—an average of 3000 meters being dealt with and passed through these rooms weekly; the conditions of the Act being observed. A staff of testers is supplied from the Haggerston works periodically to test all the large wet station meters at the Company's various manufacturing stations, in addition to all the wet and the very large dry meters on the premises of large consumers.

All meters are passed through the sounding room, and placed under a gas pressure of 10 in. water gauge, to ensure that they will withstand the maximum pressure within the Company's large area of supply. Much interest was taken in the two spraying bays which are in use for the spraying of the interior of meters with solar distillate. The oil is injected in fog form under 30 lbs. pressure per sq. in., and reaches every portion of the internal mechanism, diaphragms, &c. The excess vapour is removed from the bays by means of a suction fan, driven by a 10 B.H.P. gas-engine, which also drives the compressor for the oil spray. Approximately 1800 meters are dealt with weekly by this process. Slight adjustments of the registering mechanism are made in a special room lighted by general diffusion by means of aluminium lamps, with upturned reflectors and silica cylinders, thus avoiding all eye strain on the operators. High-pressure meters are tested and sounded by air, which is taken from the oil-spray plant. A number of tests at various pressures are made, the gas being reduced to 2 in. on the outlet of the high-pressure meter, and then passed through a 20-light test meter for the purpose of registration. Governors and argand burners removed from old stoves awaiting repair are taken apart, cleaned, and tested. When re-assembled, they are set to pass the volume of gas required.

All meters returned from the Company's districts dealt with by Haggerston are first tested at these works, and, if official tests are required by the district staff, are dispatched to the several London County Council testing stations; the indices, badge numbers, addresses, &c., being recorded. In connection with the removal of meters from consumers' premises, which necessitates their being sent to the official testing stations, it is interesting to note that the meter has to be handled no less than some thirty-three times, due to the loading, unloading, checking, stocking, testing, &c.; and under the present conditions they cannot be dealt with more economically, compatibly with efficient work. There are four store rooms for meters, with an approximate total cubical capacity of 90,000 c.ft.; but even this is found not to be enough. Evidence of carefulness is to be seen in the fact that all gas used in connection with the testing of meters is conveyed into two recovery holders, each of 3300 c.ft. capacity, which are operated alternately under a slight vacuum; the gas being taken from these holders in turn to the main stove repair shops, where it is used for testing stoves, &c., during repair. Care is taken to ascertain from time to time that the inerts due to the air percentage in this gas do not become appreciably increased.

Coming next to the section devoted to stoves, boilers, &c., it may be stated that stoves returned from the district are stacked in a large building to await their passage, in turn, through the renovating shops; an average of 620 cookers, heaters, &c., being received weekly at the works. After the removal of the brass parts, cookers are placed in large coke-heated ovens, for burning-

off fat, &c.; the brass parts being immersed in hot water and soda vats. After being burned-off, the cookers are taken to pieces; old sound parts and new parts are fitted where necessary; and they are finally painted and tested before being passed into stock. The number badge is retained throughout each process. It is hoped soon to introduce gas-heated ovens for burning-off. Gas-fires are treated by the hot soda bath process, to ensure the thorough cleansing of the cast shells. They are then dried, passed through the repair shop, re-assembled, and the brass parts cleaned. They are in turn passed into the enamel spraying room, treated in a similar way to the meters, so far as spraying is concerned, and afterwards stoved-off in low-temperature muffles heated by coke. The enamel spray is operated by a Worthington horizontal compressor, driven by a 14½ B.H.P. gas-engine, the surplus spray being removed by a suction fan at 1000 revolutions per minute. The spray-plant pressure is operated at 45 lbs. per sq. in. Flexible shaft brushes are used for brushing-up, preparatory to the enamel spraying, stoves and parts where light films of rust have formed. Large condensing stoves are first burnt-off in the coke-heated ovens used for cookers, as they are inconvenient to handle in the vat process. The main stove and boiler repair shop covers an area of 9320 sq. ft., and about 110 men are regularly employed therein. One section is given-up to the grinding of castings and the polishing of copper tubes, &c.; while another is used for the testing and repair of boilers and circulators before and after use on the district. This section of the Company's business has so increased that a special shop is being provided for the process. There is in use a plant for the re-tinning of sound drip and grill tins, and the re-plating and polishing of gas-fire trivets, fenders, bar-stove cups, urns, &c.; a 12-volt, 250 ampère dynamo set being used for this purpose. In addition to the gas-engines specially mentioned, several others are employed in different parts of the works.

It was seen on all hands that great strides are being taken by the Company towards standardization; and something of what standardization must mean, in the case of an undertaking of this magnitude could be appreciated from a glance at the numberless bins in the stores containing parts of cookers, fires, &c. Some idea of the vastness of stocking of parts can be arrived at when it is stated that the Company are responsible for the upkeep of over 500 different types of cooking and heating stoves, &c., the different parts of which are known to exceed 15,000; and the total stoves, boilers, and the like, on the Company's area is estimated to exceed 710,000. Some 100,000 c.ft. is already occupied by new and renovated stoves awaiting issue to the districts. This space is being considerably increased in the near future, to meet the large growth of business. The stores are heated by steam piping, so as to keep the new apparatus in proper condition. The average weekly output of the works, including new and repaired stoves, meters, boilers, &c., is 1400 stoves and boilers and 1600 meters. This in addition to a weekly output of 1300 stoves and boilers and 1100 meters from the Fulham stove works.

The tour completed, a return was made to the test room, where, in the interval, tea had been laid out by the Company's catering department. After this had been enjoyed,

The PRESIDENT (Mr. D. Cleave Cross) said they had all had an excellent opportunity of adding to their stock of knowledge that afternoon. It had been a very profitable visit indeed. He himself had been amazed at what he had seen. The amount of detail work that had to be carried out was colossal. It was quite evident that the Company were fully alive to developments in the industry. The "Hollar" boiler which they had seen was certainly very efficient; and it seemed to him that it was going to be a good thing. The conversion of the cooker hotplates to a new and more up-to-date type, which was now being undertaken, was also very important. In fact, they were evidently trying to bring everything up to the highest possible state of efficiency. Mr. Holt had done all he could to help them that afternoon, and had hidden nothing.

Mr. W. L. WESTBROOK proposed a hearty vote of thanks to the Gas Light and Coke Company for the permission to make the visit and for their hospitality, and to Mr. Holt, Mr. Larkin, and the assistants already named, for the trouble they had taken in showing them round. The information the members had gained would certainly prove of value to the various undertakings with which they were connected.

Mr. D. J. WINSLOW, in seconding, agreed that it had been a most informative afternoon, and said they had all been struck with the immensity of the business.

Mr. W. J. LIBERTY supported the vote, and remarked that 31 years had elapsed since he was last at the Haggerston works; and Mr. Fagan, who had lately retired, was then in charge.

The members having emphatically expressed approval of the proposition,

Mr. HOLT, on rising to return thanks, said that Mr. Thomas Hardie, the Company's Chief Engineer, had intended to be present to welcome them, but had written expressing his regret, through another engagement, at not being able to do so. He had sent his best wishes for an interesting and profitable afternoon. Personally, it was a great pleasure to him (Mr. Holt) to welcome the Association. He only came to Haggerston last August; but as he had been about 26 years on the district, he pretty well understood the sort of troubles with which they had to deal. Every effort was put forth to make things as easy as possible for the district staff, from the inspector right down to the fitter's mate. The Company were very enterprising, and were always ready to welcome and test any new ideas that might come along. It was therefore nothing out of the way for them to change the cooker hotplates from the old type to the new. They would be sending out all their cookers on the most up-to-date lines in the future. Thousands had already been sent out, and now the Board had decided that they should all be altered. The "Hollar" boiler, to which reference had been made by the President, had perhaps a curious name; but it was made up of the first three letters of "Holt" and "Larkin." It possessed various features which rendered it eminently suitable for housing schemes and small flats; and it was a very simple arrangement. With it one could practically get a geyser effect, with not quite a geyser efficiency. The efficiency was about 78 p.ct. It had been patented; and the makers were Messrs. Richmond, who were now considering the advisability of turning it out in a larger size. He mentioned that every new fire now purchased was bought with an adjustable outlet. He hoped this would not be the last time that they would see the members of the Association at Haggerston.

Mr. LARKIN said it had also been a great pleasure to him to come along and help to take the parties round. For a long time they had realized the drawbacks that existed in many of the old cookers, and had done their best to overcome the difficulty. They were very hopeful that in the new standard cooker they would have one that would give satisfaction in every respect.

The Mechanical World Year Book.

While the information contained in this annual publication is, as its name implies, essentially for the mechanical engineer and those under him, it embraces much of universal utility—especially the comprehensive range of tables; and the gas engineer who kept a copy in his office would probably find the modest outlay had been well spent. The year-book is published at the price of 1s. 6d. net, by Messrs. Emmott and Co., Ltd., of Manchester and Bedford Street, London. It is rather disappointing, in spite of the book's field of application, to find that the notes on gas practice are confined to a fairly full treatment of the operation and design of gas-engines; and it seems that these might with advantage be somewhat modified in view of modern conditions of gas supply. The notes remark that the standard value of town gas is stated in different gas-engine makers' catalogues as 600 to 700 B.Th.U. per c.ft. It is added, however, that this high calorific value is rarely attained in the majority of towns. A few notes on coal purchase, utilization, and conservation would surely not be out of place nowadays; and we should like to find some mention of gaseous firing, applicable as it is to so many operations within the ken of the mechanical engineer.

Circle of Scientific, Technical, and Trade Journalists.

The annual meeting of the Circle of Scientific, Technical, and Trade Journalists was held on Tuesday, Jan. 9, Mr. Leon Gaster presiding. The meeting was preceded by a dinner in the hall of the Institute of Journalists, and the Technical Press was well represented. In opening the proceedings, Mr. Gaster briefly surveyed the activities of the Circle since he had taken up the chairmanship in 1914. During the war addresses were frequently delivered by officials connected with Government Departments, and the Circle acted as a channel of information to the Technical Press. Arrangements have recently been made for visits to works where processes illustrating the application of science to industry are carried on. Sir Richard Gregory (whose services to science and technical journalism are well known) was elected Chairman, and Mr. A. C. Meyjes Vice-Chairman. Mr. Gaster has consented to act as Hon. Secretary and Hon. Treasurer; and two Hon. Assistant Secretaries, in the persons of Mr. Percy L. Marks and Mr. P. N. Hasluck, were elected to deal respectively with the arrangement of papers and discussions, and with visits and the social side of the Circle's work. A cordial vote of thanks was accorded to Mr. Gaster for his services during the past eight years. In responding, he expressed the belief that the Circle has a useful future before it. Sir Richard Gregory then delivered an address on "Reviews and Reviewers," which led to an interesting discussion. Many points of considerable interest were raised—such as the question whether reviews should be signed or unsigned, the selection of reviewers and books to be reviewed, and the best manner of presenting reviews of books submitted. Interchange on such views between editors of technical papers is extremely useful, and will no doubt help towards uniformity of practice in regard to several rather debatable problems.

Automatic Temperature Control.—Those interested in the increasing use of central heating in this country were given information which would lead to economy in working and also in fuel by Dr. B. R. Wingfield, at a meeting of the Institution of Heating and Ventilating Engineers, when dealing with automatic regulation. After describing various types of regulators, he remarked that he was convinced that overheating would be avoided, and that there would be a saving in fuel to the ultimate benefit of the community, if temperature regulation was made a regular part of every central heating installation, whether large or small. Increased numbers of installations would bring-down first costs, and the reputation of central heating of being a costly, and therefore a luxurious, method of warming, would disappear. This question of reliably regulated and simple central heating was very important at the present time, on account of the difficulty of getting domestic help. There was no reason why a carefully planned hot-water heating installation should materially add to the cost of (say) a five or six-roomed house, if the saving in chimneys and fireplaces were taken into account.

LOW-TEMPERATURE BYE-PRODUCT PRODUCER GAS.

Particulars were given in the "JOURNAL" for the 3rd inst. (p. 38) of a patent taken out by Mr. W. Beswick and Mr. N. E. Rambush, of the Power Gas Corporation, for the manufacture of producer gas of a calorific value of some 170 B.Th.U., while recovering the maximum yields of bye-products, under low-temperature conditions. We have since heard from Mr. Rambush that the highest quality of gas the Corporation have obtained in their low-temperature producer plants is 200 B.Th.U. per c.ft. gross. Altogether apart from this process, however, the Corporation are hoping within the next few months to be able to place before the public results in connection with the manufacture, in some special gasification plants which are being erected in this country, of a gas of a grade such as that which is being supplied by many gas-works.

DISTINCTIVE POINTS REGARDING LOW-TEMPERATURE PRODUCER GAS.

Dealing now with the manufacture of bye-product producer gas under low-temperature conditions, it may be mentioned that this formed the subject of a paper read recently before the West of Scotland Iron and Steel Institute by Mr. Rambush, in the course of which he detailed some of the latest developments that have been carried out by his firm in this branch of industry. He said that, to obtain a high yield of bye-products in an economical way, so far as the tar is concerned, it is essential that the fuel be submitted to a low-temperature treatment; while in the case of ammonia it is essential to have a long time factor between the steam and the carbon in the fuel. Fortunately these two conditions can be fulfilled by observing only the one; since, as soon as a long time-factor is given, then more steam is decomposed, and the final temperature of the gas leaving the fuel is decreased. A low gas-outlet temperature always means that the sensible heat contained in the gas is correspondingly low; and the thermal gasification efficiency will be correspondingly high. The quantity of the heat of the fuel which is converted into sensible heat of the hot gases leaving the producer is at least 12 to 15 p.ct. on ordinary hot-gas producers—say, as used in steelworks practice—while on a Mond bye-product recovery gas producer it may be as much as 16 to 20 p.ct.

A gas producer may, however, be considered as a self-contained heat generator in which only a certain amount of the fuel (carbon) is completely burnt to make-up the losses adherent to the gasification process. If, therefore, the sensible heat content of the gas leaving the producer is reduced (due to a lowered gas-outlet temperature), then a smaller amount of the carbon of the fuel will have to be "completely" burnt to make-up this heat. This means, again, that the producer gas will contain a smaller amount of "products of combustion"—that is, its heating value will be higher. Not only is this theoretically correct, but by reducing the sensible heat content in the gases of a bye-product recovery producer from about 16 p.ct. to 9·10 p.ct. of the fuel, it has been established under practical working conditions and equal rates of gasification that the heating value of the gas is increased from 135 to 140 B.Th.U. to 155 to 160 B.Th.U. per c.ft. net; while by further reduction of the sensible heat loss to 5 p.ct. of the heat in the fuel, the heating value of the cold gas is increased to 175 to 180 B.Th.U. net per c.ft. at N.T.P.

The author therefore considered himself justified in laying-down the rule that, for the same load, the lower the gas-outlet temperature the higher will be the heating value of the gas.

It is, he went on, obviously uneconomical to obtain the larger time for gasification (that is associated with a low gas-outlet temperature) by lowering the gasification rate per unit cross-sectional area of the producer. Therefore the only practical way in which to bring this about in practice is to increase the fuel depth.

Apart from the advantages attached to a gas producer of a low-temperature type in regard to an increased thermal efficiency and gas quality, as well as ammonia and tar yield, there are two further advantages to be mentioned. First and foremost, the gas quality remains steady, independent of the charging intervals. It is quite common experience (and is an argument justifiably used by sales representatives of many makers of mechanically stirred and charged producers) that a producer charged intermittently—say, by an ordinary hopper—shows considerable fluctuations in gas composition. The chief reason for these fluctuations is that immediately after the charging period, the main amount of the volatile matter of the fuel is quickly driven off, thus making a richer gas than that made towards the end of the charging interval. With a producer working on the low-temperature principle the gas-outlet temperature can be maintained below that at which the volatile matter of the fuel (except water vapour) distils off. Consequently a man may charge a properly designed low-temperature producer only once every hour or two without making any appreciable difference to the gas quality. The other advantage attached to a low-temperature producer working with a deep fuel bed is the particular property of easily carrying overload without increased operating difficulties.

A gas producer in which the fuel is treated at a low temperature can be arranged in different ways. In all cases, however, it is necessary to utilize the sensible heat of the hot producer gas from the lower zones to distil the coal previous to its entering the said zones in the producer. The Power Gas Corporation have now developed two types of this kind of bye-product producer gas plant to substitute for the original Mond recovery process. These bye-product producer gas plants may here be designated the "true low-temperature" and the "semi-low-temperature" producers, in accordance with whether the final gas temperature is considerably below the tar evolution temperature of the fuel or approaches the same.

The reasons why the firm has considered it advantageous to undertake such extensive industrial research are that, with existing conditions of expensive labour, fuel, and first cost of plant, not to speak of the possibility of a considerable future reduction in the market price for sulphate of ammonia (due to successful synthetic ammonia processes), the economical position of a Mond gas plant becomes an entirely different one from what it was previous to the war—so much so that during the last few years a very large number of gas-producer plants in this country using the Mond bye-product recovery process have been shut-down or worked without recovering the ammonia.

THE SEMI-LOW-TEMPERATURE PRODUCER.

This type of design is mainly applicable to existing producers, and at the present moment there are four large Mond gas plants in this country being modified to work on this system. The total quantity of the fuel under gasification has been increased considerably by extension in height of the fuel bed and modification of the shape of the top plate, while the central fuel-feeding bell of the Mond producer has been substituted by what may be termed a circumferential fuel feed. The latter arrangement is obtained by extending the mouth of the gas outlet pipe to a position somewhat below the surface of the freshly-charged fuel, the gas outlet pipe being, so to speak, "luted" in the coal. Nearly all gas producers of the ordinary static type tend to burn more intensely at the edges; but when the gas outlet pipe is arranged as indicated, all gas must pass through the centre of the top of the fuel bed before leaving, thus ensuring that the central fuel particles are heated-up simultaneously with those particles which are nearer the lining. As a matter of fact, the fuel temperatures, in a bye-product recovery producer with central gas outlet pipe, across a horizontal plane just below the internal fuel (inverted) apex, have been found to be practically even, and varying with the load factor from 250° to 450° C.

The advantages established by working the altered producer over the old unaltered ones in the same battery may be summarized as follows:

(1) The average daily gasification is 50 p.ct. higher.
(2) The gas-heating value is 160 B.Th.U. net per c.ft. (N.T.P.), instead of 140 B.Th.U.
(3) The carbon in the ash is 15 p.ct., instead of 30 p.ct.
(4) The ammonia yield remains unaltered, although the steam consumption is nearly halved.
(5) The tar yield is increased by about 30 to 40 p.ct.
(6) The thermal efficiency of the producer itself (apart from the steam saving) has been increased by about 10 p.ct.
(7) No superheating of the air blast is required, thereby bringing about decreased upkeep charges.

THE TRUE LOW-TEMPERATURE PRODUCER.

This producer is designed on very similar lines to the semi-low-temperature producer, except that a larger time-factor is allowed for, thus causing the volatile matters to be more slowly evolved. The actual fuel depth required to bring this about will alter considerably with the fuel composition and grading. Late in 1921 a 5 ft. internal diameter producer, having been modified to operate on this principle, was put to work in Stockton-on-Tees. During five months when tests were being carried out, no poker was ever inserted through the top poking holes. This occurrence was entirely contrary to expectations, since the very same fuel, when used in ordinary producers, required about the amount of poking from the top poking holes usual with a reasonably suitable producer fuel.

A COMPARISON.

To summarize the typical differences which these two types of bye-product recovery producers show in comparison with a bye-product recovery plant working on the Mond principle, the following table [overleaf] has been prepared, which gives not only the gas analyses and operating results, but also the thermal efficiencies of the gas producer itself, and the over-all efficiency of the installation. The "over-all" figure includes the fuel required for raising the necessary steam for the gas-producer plant—a boiler plant of average efficiency having been assumed.

In working-out the over-all figure, two calculations have been made—namely, (A) when all the steam for the plant is raised by firing the boilers with coal only, and (B) when all the tar made on the gas-producer plant is used to replace some or all of the coal for steam raising.

It should be noted that the only plant which is self-supporting in regard to steam when supplied from this source is the true low-temperature producer; but most likely it is not a commercial proposition to burn all the low-temperature tar under the boilers, since its commercial value will be higher than that represented by its heating value. The basis of assuming the tar being utilized under boilers, and not as a sales product, is therefore a conservative one.

Typical Comparison of Various Bye-Product Gas Producers.

ASSUMED FUEL ANALYSIS.

Ash	12·0 p.ct.
Volatiles	37·0 ,,
Nitrogen	1·4 ,,
Net calorific value	12,000 B.Th.U./lb.

—	Ordinary Mond Process.	Semi-Low Temperature Mond Producer.	True Low Temperature Producer.
GAS ANALYSIS (P.Ct.)—			
CO_2	16·0	11·0	8·3
CO	11·0	17·5	20·5
H_2	25·0	21·5	20·5
CH_4	2·7	3·3	5·5
N_2	45·3	46·7	44·9
Net calorific value, B.Th.U./c.ft. (N.T.P.)	135 9	153·7	182·3
Theoretical flame temperature of gas	1,588	1,697	1,775
OPERATING RESULTS—			
Gas yield per ton of fuel gasified, c.ft. at N.T.P.	133,500	133,000	118,000
Ammonium sulphate yield, lbs. per ton of fuel gasified	90	95	90
Tar yield, gallons per ton of fuel	10	18·5	21
THERMAL EFFICIENCIES—			
Gas producer efficiency proper.			
Excluding tar recovered	68	76	80
Including ,, ,,	74	87·2	92·3
Over-all gas producer efficiency, including coal for steam raising—			
Without burning tar recovered. (A)	53·5	64·4	69·5
Burning tar for steam raising (B)	56·7	72 8	80·0
To get heat in cold clean gas equivalent to that obtained by burning 100 tons in plant using Mond process and boilers, we must burn (A)	100 tons	83·2	77
(B)	100 ,,	78	70·9

The last two lines of figures in the table are made with the object of showing how much coal would have to be used in a works where a plant working on the Mond process is substituted by either a semi-low-temperature plant or a true low-temperature plant supplying the same total amount of heat units in the shape of cold clean gas. It will be seen that there is a saving on fuel expenditure in the low-temperature plants of between 20 and 30 p.ct. of that which is consumed by the Mond process. When the gas is to be used in connection with firing boilers or heating furnaces, the higher flame intensity of the low-temperature gas over the ordinary Mond gas will cause an additional saving.

For the same tonnage gasification capacity as a Mond gas plant, the low-temperature plants (apart from delivering 20 to 30 p.ct. more gas per ton of fuel) can be:

(1) Installed to-day at about the same cost as a Mond plant under pre-war conditions.
(2) Worked with from 10 to 30 p.ct. less labour, depending upon the size of installation.
(3) Accommodated on half the ground space.

Sheringham New Capital Issue.—The new issue of preference gas capital by the Sheringham Gas and Water Company, which was announced by Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., in last week's issue of the "JOURNAL," is necessitated by the steady expansion of the business. The amount of the issue is £9000, and it is entitled to a dividend of 7 p.ct. per annum until Dec. 31, 1927, and 6 p.ct. per annum after that date.

A Generous Council.—Under the Coal (Pitmouth) Prices Order, the Burton-on-Trent Town Council became possessed of £300; and at the monthly meeting last week they decided to distribute this sum among the officials of the gas department. The Gas Committee intimated that the members of the Council could see the list of recipients; but they were not prepared to let the names become known to the general public. The Council accepted the Committee's decision without comment.

Gas Appliances at Accrington.—The Chairman stated at a meeting last week of the Accrington and District Gas Board that there would be a considerable reduction in the price of gas on April 1. The Manager (Mr. A. J. Harrison) said they intended to make a thorough canvass of the district, so as to obtain a complete record of appliances used by the public for cooking, washing, &c. This would enable the Board to concentrate on a scheme for a greater use of gas appliances. Since last April the Board had sent out 500 cookers and boilers; and during his five years with the Board, they had issued 4000 such appliances.

Malvern Gas Price.—The Gas Committee of the Malvern Urban District Council, in dealing with the requests from consumers of gas for a reduction in the price (5s. per 1000 c.ft.), recommended that the discount allowed on ordinary gas accounts be increased from 5 to 10 p.ct., and that consumers through slot meters be given a rebate of 1d. in every complete shilling, to take effect after the next collection. It was stated that the extra 5 p.ct. discount was only a temporary arrangement, as the Committee could not decide what profit would be made until after the end of the financial year, when it was hoped that a handsome reduction in the price of gas would be made.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Low-Temperature Carbonization and the Therm.

SIR,—From my recent articles, it might be assumed that I am antagonistic to low-temperature carbonization as such. During the past week I have had the pleasure of an interesting discussion with Mr. Chaney on the subject; and, apart from the question of the figures which I have criticized, Mr. Chaney and I are not so far apart in our ideas as my comments may indicate. After putting the figures right, I do not wish to suggest that there is no room for gas from the low-temperature plants. In fact, I should like to take this opportunity of stating (as I did to Mr. Chaney during our discussion) that I am of opinion, and have been for the past two or three years, that the future of the low-temperature plants is in the hands of the gas industry.

Long before Sir George Beilby furnished his report in which he drew attention to the virtues of a small percentage of this high-grade gas, I pointed out to the commercial officers of the Low-Temperature Syndicate that, instead of "ploughing the lonely furrow," as they were attempting to do, their future lay in co-operation with the gas industry.

GEO. EVETTS.

Palace Chambers, Bridge Street, Westminster, S.W.
Jan. 13, 1923.

Cast-Iron or Steel Mains.

SIR,—My respected friend, Mr. B. R. Parkinson, once again claims, in your issue of Jan. 10, that steel pipes are the only pipes, and attributes the lamentable accident at Bethnal Green to the fact that cast-iron pipes had been used.

Unfortunately, Mr. Parkinson suffers from the disadvantage of having written a book—and a good book at that—on the subject of steel pipes; and I am afraid that for the rest of his natural career, in season and out of season, his duty will be to preach the gospel of steel for all and every purpose. I am foolish enough to believe that the requirements of the world are large and diversified, and that cast iron, steel, concrete, and other forms of pipe, each has its advantages under conditions favourable to it.

Friends of my Company whose interests I have the honour to direct, lost no time in coming forward and stating that I was foolish in taking up the manufacture of a concrete pipe, in view of the fact that this pipe would be in direct conflict with the cast-iron pipe. Two years of active trading have shown that, while a large volume of concrete pipes have been manufactured and sold, probably in no single instance have those pipes been installed where cast-iron pipes would otherwise have been placed. More than ever to day do I realize that cast iron, steel, and other forms of pipe have their sphere of usefulness, and that not one of them has the right of claiming monopoly for dealing with all and every requirement.

In saying this, I am obliged to confess that I believe that the newcomer in the form of the "spun" iron pipe is capable, on its merits, of replacing within the limits of its sizes both the cast-iron and the steel pipe manufactured under existing processes. While the "spun" pipe is made from the identical metal used in the manufacture of the cast-iron pipe, the resulting material approaches in tensile strength that of steel, and gives a modulus of elasticity far in excess of that possible when the same material is cast into a pipe in the ordinary way.

I will refrain from following my friend Mr. Parkinson's lead in writing a book on the subject, as were I to do so I should for all time be committed to a standard that is good practice, and the best to-day, but what we all hope may be supplanted in the advance of progress in the future.

For the Stanton Ironworks Company, Ltd.,
E. F. FOX, Managing Director.

Stanton Ironworks Company, Ltd.,
Near Nottingham, Jan. 13, 1923.

Gas Accounts and Therms.

SIR,—You were quite correct when you assumed in your last issue that more foresight had been displayed in connection with the form of account than the industry had been credited with.

In this town the charge has been by therm over a period of twelve months, and the form of account introduced by me during the first quarter of the new system of charging is on "all fours" with that in operation at Sheffield and Bristol. We have experienced no trouble whatever over the change.

H. J. WOODFINE, Manager.

Wellington (Salop) Gas Company, Jan. 13, 1923.

Controllers for Public Lamps.

SIR,—I have received an advance copy of a letter from the Horstmann Gear Company to you, and below is a copy of my reply to that communication, which I trust you will publish

E. BURKE.

Jan. 10, 1923.

[ENCLOSURE.]

The Horstmann Gear Company, Ltd.,
Newbridge Works, Bath.

SIRS,—I received with interest your letter of the 9th inst., and can only say that the reasons given in my paper for the choice of Gunning controllers were correct at the time I was employed at Birmingham.

I had experience of your rapid lighter from early in 1911 until 1920, when I severed my connection with Birmingham; and I think I am correct in stating that no real purchases took place between these dates.

As regards the back-firing, it has been my experience that there is a tendency to back-fire with "quick lighters." The same back-firing does occur even with lamps that are turned-on by hand and have a by-pass for lighting, but does not occur where the gas is lighted by a torch; the time elapsing between the turning-on of the gas at the lamp-

cock and the applying of the torch at the burner being sufficient to clear away the explosive mixture.

I am pleased to know that you have recently supplied such extensive quantities to Birmingham; and I will certainly and willingly make the *amende honorable* at the meeting. E. BURKE.

The Therm Inquiry.

SIR,—It is unnecessary for me to reply to your editorial note on my recent letter, as it has been so well dealt with by your other correspondents.

There is, however, another observation I should like to make—namely, that the fact appears almost lost sight of that the gas industry has always been subject to a quality test for gas supplied; and the only fundamental alteration in this question of quality is the substitution of a heat for a light basis, with power to vary the quality from time to time. I wonder how it would have been received by the industry if it had been proposed at any time during the light basis of supply to render accounts in terms of candles in place of therms?

Does not the whole thing boil itself down to a revision of the old standard or maximum prices to suit existing conditions and prices; or is it that it was essential to compare neighbouring undertakings on an equality basis for price? H. HIGHAM.

Gas-Works, Teignmouth, Devon, Jan. 13, 1923.

Electric Power in Gas-Works.

SIR,—I thank you for your criticism [see p. 80] of my article on "The Driving of Handling Machinery," which appeared in "The Electrician" of Dec. 29. I am pleased to note that you have drawn particular attention to two very important points to which short references were made in the article—namely, (1) the reliability of power supply to gas-works, and (2) the competitive economy of the electric drive. If I may do so, I should like to reply to your criticism, as it appears to me that you have missed some of my remarks bearing upon these two questions.

(1) With regard to "reliability," you say that I have overlooked the importance of a continuity of power supply to gas-works; but if you will be good enough to refer to my article again, you will find that I wrote: "No doubt many gas managers would soon be quite converted to this new (outside) supply *if* they could be *absolutely* assured of a continuity of supply at a reasonable charge." I also previously referred to the desirability of installing duplicate generating sets in cases where electric power is produced within the gas-works. I think you will agree that these statements clearly show I had the matter of "reliability" very much in mind when I wrote the article.

(2) As to competitive economy, your criticism is evidently directed by consideration of *all the factors* which have to be taken into account when striking a balance of the "over-all economy" account. This is, of course, the proper view to take of the matter. But I suggest that if all the factors—bearing upon the advantages and disadvantages of the electric and other competitive drives—are thoroughly investigated and reduced to figures, the electric drive will always win where there are a number of different machines to be driven, particularly if they are somewhat separated or isolated, and provided, of course, that there is a suitable supply of electric power available.

You instance the "grouping system"—often used in machine shops—as a sort of proof that the electric drive is not truly economical. The most important consideration which leads to the adoption of the group system, in which one motor is made to do duty for several machines, is the "load factor" question. For instance, it would not pay to instal a separate motor, starter, and reduction gear for a machine which was only required to work for a relatively small proportion of the normal working week; and therefore, in a works where there are several of such machines which can be conveniently grouped fairly close together and driven by one motor, the average load factor on that one motor is obviously much better—and the real cost per unit of work done is much less—than would be the case if a separate motor were installed for each machine. On the other hand, it would not be an economical proposition to group machines having important but intermittent loads with other machines having continuous but relatively light loads.

Questions of "load factor," "capital costs," "maintenance and depreciation costs," &c., have obviously to be taken into account, whatever form of drive is being considered. H. BLYTH, M.Inst.C.E.

5, *Redland Park, Bristol. Jan.* 13, 1923.

Meter-Reading Procedure at Wellingborough.

SIR,—In your issue of Jan. 10, you gave a brief report [p. 88] of the procedure of some American companies in meter reading. The meter reader, it will be recalled, completes and delivers the bill, and may also collect the amount due.

I read this with special interest, for the description given applies in every detail to the practice of this Company. Started by my predecessor more than twenty-five years ago, the system has proved perfectly satisfactory; and nearly all our ordinary consumers are now dealt with in this way.

Our practice differs in another important respect from that which is usual—over 90 p.ct. of the accounts being monthly. The short term of credit, in addition to the obvious advantage of bringing in money more quickly, enables us to dispense with all formalities of reference or deposit. The monthly call of a collector keeps us in close touch with the consumers; any complaints are reported; excessive consumptions are discovered; and stopped meters promptly changed. Thus disputes are avoided and good feeling promoted. Regularity and continuity of labour are ensured; the meter readers are engaged on their own job all the year round; while the office staff work steadily, and not in frantic rushes alternating with periods of comparative leisure. The monthly account is undoubtedly preferred by the great majority of the customers; and from my experience, I endorse all that was said on this subject by Alderman Waddington at the recent "B.C.G.A." conference. A. S. CAMPBELL, Secretary.

Wellingborough Gas Light Company, Ltd., Jan 15 1923.

REGISTER OF PATENTS.

Gas Ranges and Burners.—No. 189,570.

RUSHEN, P. C., of Southampton Buildings, E. C. A communication from the William M. Crane Company, of New York.

No. 23,881; Sept. 7, 1921.

The primary object of this invention is to provide a gas range of the shallow type, having the advantages of a closed cooking top, as described in specification No. 169,956 [see "JOURNAL" Vol. CLX., p. 377].

The range has a closed cooking top and a combustion chamber underlying the top and co-extensive with it. The burner is housed in a chamber very near the top of the range; and the secondary air is admitted through ports in the bottom half of the burner, and reaches the flames through conical passages in the upper half. The whole jacket of the combustion chamber forms a flue passage; communication being by apertures of suitable area and distribution.

Other features of the invention are the provision of a bed of refractory material in the combustion chamber, means for locking the gas-supply pipe in its best position, and the special design of the burner.

Injectors for Incandescent Burners.—No. 189,636.

GOULD, F. J., of Little Trinity Lane, E.C. 4.

No. 29,657; Nov. 7, 1921.

This invention relates to needle valves or injectors for incandescent gas-burners, wherein a screwed stem is adapted to engage with an inclined aperture or slot formed in the needle body. In such valves it has been suggested previously to provide the body with an axial hole extending down to the inclined aperture or entirely through the body.

According to the present invention, the body part is provided with an additional space or slot to accommodate the stem part of the adjusting screw and to permit of vertical movement of the body part, which is provided with grooves in its sides to allow the passage of gas. The inner end of the screw is preferably rounded so as to ensure easy and smooth movement in the inclined opening or slot.

Gas and Air Regulation.—No. 189,853.

GOEHDE, R., of Berlin.

No. 23,383; Sept. 2, 1921.

This invention relates particularly to gas-ring burners for cooking puposes, and has for its object to enable the user to ascertain the required adjustment directly from a scale provided on the plug of the gas cock, whereby the adjustment is not dependent on the personal judgment of the user, who is in a position at any moment from the commencement of cooking onwards to use a small, medium, or large flame, according to which is most economical in the circumstances; the gas consumption being completely under control without any fear of wasting gas. According to the invention the gas cock, in addition to being provided with a plug having a number of circumferential holes of increasing cross sectional area that are adapted to come successively into communication with the same exit nipple when the plug is rotated, has attached to it an indicator disc having graduations corresponding to the rate at which the gas is passed by the respective holes; three air regulators connected to the gas plug being provided for admitting primary air to the burner and secondary air to the gaseous mixture inside and outside the flame ring, respectively.

Charcoal Recovery of Coal-Gas Products. No. 190,203.

JOHNSON, J. Y., of Lincoln's Inn Fields, W.C. A communication from the Badische Anilin- & Soda-Fabrik, of Ludwigshafen-on-Rhine.

No. 21,874; Aug. 17, 1921.

This invention is a further development of the subject-matter described and claimed in patent No. 170,152, and relates to the separation or production, by means of charcoal, of valuable constituents from coal gases—namely, benzene-hydrocarbons and sulphur and, if desired, ethylene hydrocarbons or derivatives thereof.

In the prior specification the correspondents described an improved process for desulphurizing gases, in which the gases were first purified from tarry matter by passage through charcoal and then treated with active charcoal in the presence of oxygen to remove the sulphur. It has now been discovered that it is of primary importance completely to remove from the gases all of the benzene hydrocarbons present prior to the sulphur absorption taking place; and only by following this procedure will it be possible to obtain in one operation pure benzene-hydrocarbons, sulphur, and finally (if it be so desired) ethylene hydrocarbons and also a purified gas free from all these admixtures.

The patentee is aware that the several steps constituting the process claimed in this specification are known by themselves. It is the combination of the steps in the order specified which is covered by the patent; the claims being for: The recovery of valuable products from coal gases, which have been previously freed either completely or to a large extent from tarry matter and cyanogen compounds, by bringing the same into contact with active charcoal so as to remove first all the benzene hydrocarbons present, then hydrogen sulphide in the state of free sulphur (after a sufficient amount of oxygen containing gas and optionally ammonia has been added), and finally ethylene hydrocarbons, if it be desired to remove them also, and subsequently extracting the absorbed products from the active charcoal. As an alternative step in the process, the conversion of ethylene into ethylene compounds by causing it to react with halogen or such other bodies as will produce ethylene compounds in the presence of active charcoal, and the subsequent removal of the said compounds from the charcoal.

Pendant Gas-Fittings.—No. 190,272.

PRIDE, H. C., of Oxford Street, W.

No. 25,579; Sept. 27, 1921.

The pendant gas-fitting which is the subject of this invention was noticed and illustrated on p. 156 of the "JOURNAL" for April 19 last. The objects are to conceal entirely the gas connection from the ceiling rose to the lamp, to retain the swinging movement of the fitting, to obviate strain to the components when cleaning or re-fitting the lamp, and to conceal the lamp and its fittings to a greater degree than heretofore. Such a fitting can be supplied which merely requires attachment of the rose to the ceiling.

Broadly, the invention consists in the employment of a hollow gas-tight rose, conveniently in two parts screwed together, which on its flat ceiling surface is formed with a threaded aperture or other union to join to any usual gas pipe or plug projecting from the ceiling. The rim is suspended by three or four more supporting tubes secured to the rose by half-round ball-headed screws (or equivalents) giving a free swinging movement. One tube is in open communication with the hollow rose and is used as a gas pipe, while the others are plugged and gas-tight. The tubes are all hooked at their lower extremities or otherwise secured to the rim; and the gas tube is formed with an elbow radially extending inwards, and carrying an inverted (or upright) fitting, with any means of focussing the lamp with respect to the fitting. The gas cock and operating chains, with or without a bye-pass, are suitably arranged; and any means (such as a spring insertion) are employed so that the movable socket of the gas-tube is gas-tight.

Atmospheric Burners.—No. 190,304.

CANNON IRON FOUNDRIES, LTD., and HAWTHORNE, H. S., both of Bilston.

No. 27,612; Oct. 18, 1921.

The type of burner to which this invention relates was described and illustrated in our "Register of Patents" in the "JOURNAL" for Dec. 20 last—patent No. 188,920. This later specification covers the integral construction of the tube or sleeve (carrying the screw-pin or valve) and the chamber carrying the gas nozzle; the opening in the side of the sleeve communicating with the chamber.

Leak-Tight Pipe Joints.—No. 190,318.

HELE SHAW, H. S., TRIBE, E., and VICTORY PIPE JOINT CO., LTD., all of Victoria Street, S.W.

No. 28,924; Oct. 31, 1921.

In patent No. 149,381 a leak-proof ring is described having flexible inturned flanges adapted to embrace the outer circumference of the ends of pipes to be joined, and acting so that the inner peripheral lips or edges of the flexible flanges firmly embrace the ends of such pipes; and it has been proposed, in order to retain a grip between the ring and the ends of the pipes when the fluid pressure therein decreases, to provide helical spring rings interposed between the outer surface of the inturned flexible edges of the ring and the inner surface of its body portion.

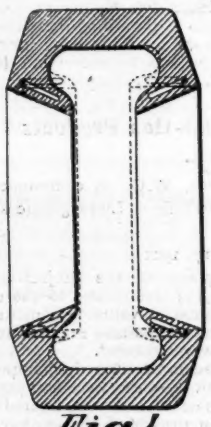


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

The present invention comprises a leak-proof ring of flexible material and of hollow cross section, having inturned edges self-sealing on the surfaces to which they are applied, wherein the flexibility of the inturned edges is obtained by, or enhanced by, means of springs embedded in such inturned edges. Two embodiments of the invention are illustrated by the accompanying drawings, of which fig. 1 is a transverse section of a leak-proof ring for use with a spring ring of which a portion is shown in plan on an enlarged scale in fig. 2, and figs. 3 and 4 are corresponding views of a leak-proof ring having a coiled wire spring ring.

In the former case the ring is inserted in the slots clearly shown in fig. 1; while the dotted lines in fig. 3 indicate the coiled wire spring of the second embodiment. These spring rings and the bores or pipe end engaging surfaces of the inturned edges are made of such dimensions that they will increase the inherent elastic properties of the inturned edges, or, in the event of their having no elastic properties supply, the elastic properties. In the example shown in fig. 1, the spring rings are made of zig-zag wire, and of smaller diameter near the adjacent portions of the inturned edges, so that when the leak-proof rings are forced upon the pipe ends their inturned edges will bear with greater pressure thereon at such adjacent portions than at their outer portions.

The springs may be of any material suitable for the purpose, and of any suitable shape, such as a fine wire spiral ring made in a similar way to the well-known form of bangle, which enables the wire to be stretched over the hand and grasp the wrist. A circular spiral spring of this form is inserted as shown in fig. 3; and if of metal or perishable material it is protected from injury. If the material used for the leak-proof ring is of rubber or any composition of rubber, such spring may be inserted before vulcanization takes place, and in use the inturned edges of the ring can take a change of form without destroying adherence between the spring and material in which it is embedded.

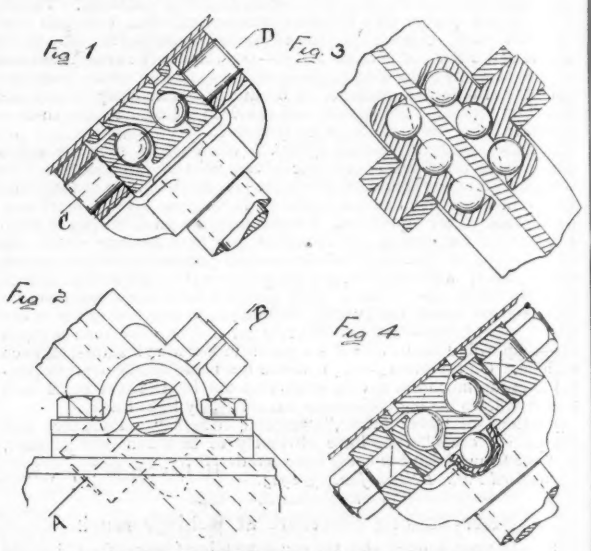
The springs, whatever their form, are so disposed or connected together as to form an internal strengthening structure for the body of the ring; an important feature of the invention being the provision of springs of such a form and disposition relative to the lips of the leak-proof ring that the compressive force is applied to the extremities of the lips.

Bearings for Gasholders.—No. 190,379.

BROADHEAD, R. W., of Elland.

No. 1296; Jan. 16, 1922.

The invention relates to the axleless type of bearing for supporting and guiding gasholders, which has been noticed in the "Register of Patents" and elsewhere in our columns. The object of the present invention is to adapt such type of bearing to the class of carriage for gasholders in which the axles of rollers are mounted on a pivoted yoke in connection with the carriage. In addition, a type of carrier may be adopted for the bearing without axles, which has pivots in compound form, or so that the bearing is mounted in or on a device having the character of a universal joint.



Adaptation of the Broadhead Axleless Carriage.

The accompanying drawings illustrate forms of the invention applied to a pivoted yoke suitable for a spirally-guided gasholder. Fig. 1 is a sectional elevation through line A B of fig. 2, which latter is an end elevation, partly in section, of a carriage arranged according to a form of the invention. Fig. 3 is a cross section through line C D of fig. 1; and fig. 4 is a section similar to fig. 1, showing a modification of the invention, in which the pocket-like carriers and axleless bearings carried by them may be applied to the yoke type of carriage without being in universal joint form.

The patentee points out that the section of rail or guide employed may be varied to suit conditions, as well as the design of the yoke attachments, without departing from the nature of the invention.

Combination Gas Stove.—No. 190,355.

SMITH, S., of Birmingham.

No. 32,937; Dec. 8, 1921. No. 24,081; Sept. 6, 1922.

According to this invention, the patentee combines together the following features: (1) A gas-fire at the lower part of the structure; (2) an oven arranged above this gas-fire; (3) a movable element disposed above the gas-fire and adjacent the oven, and adapted to be lowered when desired, this element comprising a number of gas-burners of the

ring or griller type; and (4) a high-pressure boiler or water tank arranged behind the gas-fire.

The lower burner consists of a tube which receives gas from a jet at one end and is provided with a number of nipples along its length; and one feature of the invention is to mount this tube upon blocks or bearings so that it can be rocked or partially rotated in order to direct the flames from the nipples either on to the refractory unit for heating a room or towards the boiler or towards an inclined passage behind the boiler. Means may be provided for retaining the burner tube in a particular position. The burner may thus occupy three different positions—one in which it projects the flame into the refractory elements; the second in which it projects the flame against the corner of the water boiler or tank; and the third in which it directs the flame up the flue behind the water tank.

Another feature is to make the unit which comprises the gas burner and the refractory element readily detachable from the apparatus, and to provide a coal or coke grate which can be quickly mounted and retained in its place, mainly for water-heating purposes.

Another feature is to attach the griller to the lower part of the oven upon a substantially horizontal pivot, so that when not required for use, the griller can be turned up to occupy a position in front of the oven door. When the oven is not in use, the griller will, of course, be turned down to its substantially horizontal position, and will serve as an exterior oven shelf.

Applying Lubricant to Gasholder Guide-Rails.

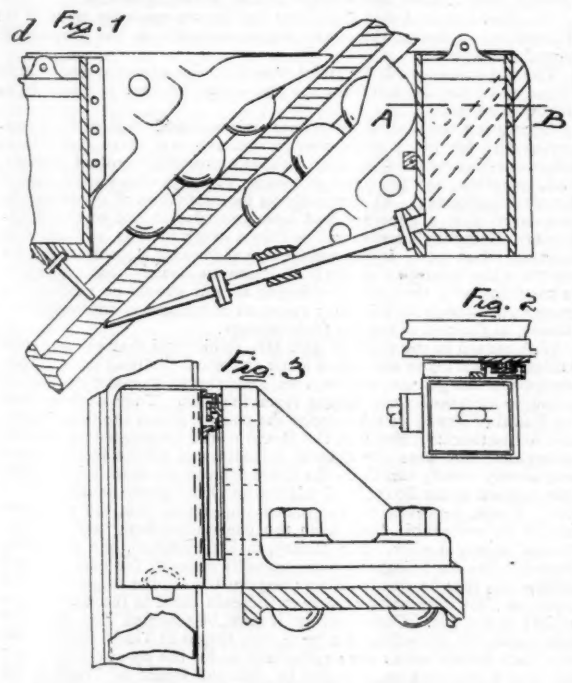
No. 196,380.

BROADHEAD, R. W., of Elland.

No. 1297; Jan. 16, 1922.

This invention is for means whereby grease or other suitable lubricant may be automatically applied to the guides or guide-rails of the various types of gasholders. The arrangement is mounted on the holder or guide-framing adjacent to the rail; and the nozzle part of the means employed may be substantially of the same shape or contour as the half-section of the guide or rail.

Fig. 1 is a sectional elevation of the invention as applied to the inclined rail of a spirally-guided holder fitted with axeless bearings. Fig. 2 is a sectional plan view of a portion of fig. 1 through line A B; and fig. 3 is a side view, slightly sectioned, of fig. 1.



Lubricating Gasholder Guide Carriages.

A vessel for containing lubricant is seen at each side of the guide carriage; and the top of each vessel is provided with a weight or cover which rests upon the surface of the grease. An aperture at the lower end of each vessel leads to a nozzle—in the case of the right-hand vessel by way of an inclined pipe.

In the case of the vessel on the left, the nozzle portion is shown connected directly; this vessel being assumed to be bolted to the carrier by flanges. The right-hand vessel, however, is mounted in a different manner. An inclined H-iron piece is attached to the carriage, and is engaged by angle irons attached to the lubricant vessel. Thus, when the feed pipe is disconnected, the vessel referred to may be slid out and into position in an angular direction, as will be obvious from the drawings. A lug or suitable stop is shown for limiting the movement of the vessel down the inclined H iron. The nozzles respectively are broadened out in plan, and made to follow the curvature of the rail, so that lubricant may reach the major portion of the surface of the guide rail simultaneously. When the means shown are applied to an ordinarily shaped or bulb-headed rail, the opening in the nozzle may extend over or partly over the head.

Instead of grease, oil or less viscid lubricant may be contained in the vessels, in which case the upper ends of the latter could be temporarily closed with lids, and very small outlets for the lubricant into or from the nozzles could be provided, to prevent the lubricant passing away too quickly. Added to which, a valve or valves could be provided (say in the piping shown) for cutting-off the supply at certain periods, or when refilling the vessels.

The design of the vessels for lubricant, and the methods of mounting the same, whether on a carrier or carriage, or at other positions, may be varied; and the patentee does not confine himself to any particular means for forcing out the lubricant.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 10.]

Nos. 1 to 562.

BICKNELL, R. H.—"Pipe-joints." No. 430.
BOX, E.—"Destructive distillation of brown coal, &c., and recovery of products therefrom." No. 428.
CARE, M.—"Manufacture of gas for power, heating, and illuminating." No. 38.
COOKE, A. G.—"Dry gas-meters," No. 411.
DRAKE, J. W., and DRAKES, LTD.—"Apparatus for charging retorts for manufacture of coal gas." No. 399.
HETHERINGTON, J.—"Joints for pipes, &c." No. 330.
HÖLSCHER, E.—"Apparatus for cooling coke." No. 168.
HORTON, J.—"Gas-fired radiators, gas-fires, &c." No. 224.
KOPPERS COMPANY.—"Regenerative retort oven batteries" No. 444.
MILLER, A. R.—"Gas lighter for coal-fires." No. 266.
MOORE, H. L. S.—"Manufacture of combustible gases." No. 164.
PHILLIPS, B. C.—See Cooke, A. G. No. 411.
SIMMANCE, J. F.—"Gas calorimeters." No. 446.
STILL, C.—See Hö'scher, E. No. 168.
STIMSON, E. F.—"Gas-pressure controllers." No. 434.

LEGAL INTELLIGENCE.

Theft from a Gas-Meter.

At the Herefordshire Quarter Sessions last week, Alexander Bolton, a machinist, was charged with stealing 5s. from a gas-meter the property of the Bromyard Gas Light and Power Company. It appeared that the prisoner had been employed at the Bromyard Public Hall as a cinema attendant, and had broken open the meter and taken the money out. He admitted having 2s., and said he was forced to take it as his employer did not pay him as he should have done. Prisoner was found guilty, and sentenced to two months' imprisonment with hard labour.

Damage to a Street-Lamp.

At the Derby County Court, on Tuesday of last week, before his Honour Judge Newell, the Derby Corporation brought an action against Messrs. Pickford to recover £12 3s. 7d. for damage to a street-lamp in January, 1922. On behalf of the Corporation, the Deputy Town Clerk (Mr. Isherwood) said the damage was done by a trailer attached to Messrs. Pickford's steam lorry. The lamp was on the footpath, about 9 in. from the kerb; and he urged that, by exercising reasonable care, the accident could have been averted. It was stated that the trailer overhung the footpath for a considerable distance. The defence was a denial of negligence. The driver of the lorry said the weather was bad, and the accident was caused by the lorry skidding. Judgment was given for the Corporation for the amount claimed.

Prepayment Meters in Lock-Up Shops.

At the Lurgan Quarter Sessions, before his Honour Judge Green, K.C., the Lurgan Urban District Council sued Mr. John Campbell, baker and confectioner, to recover a quarter's gas supply, amounting to £10 7s. The case for the Council was that when the collector called at defendant's premises the gas-meter showed that 27,000 c.ft. of gas had been consumed; but there was no money in the meter to cover this supply. For the defence it was stated that the shop was a lock-up one, and that burglars had broken in, taken the lock off the meter, and abstracted the money, amounting to the sum now sued for. The shop had been previously broken into; and the defendant had informed the collector of this, and requested him to remove money at shorter intervals. For some time the collector did so, but then reverted to the quarterly visit. His Honour held that the defence raised was equitable, and that he had no option, in the circumstances, but to dismiss the case. In a second case by the Council, in which Mr. Joseph Lavery was defendant, a sum of £6 11s. was sued for in respect of 17,500 c.ft. of gas. Proof was similar to that in the first case; the collector stating that the meter was broken open, and he found no money in it. Defendant informed the Court that when, on a Monday morning, he discovered that the meter had been broken open, he notified the Gas Manager, but did not inform the police. The Judge said it was evident, in this instance, that proper care had not been taken, and defendant was not entitled to a ruling on the line adopted in regard to Mr. Campbell's case. He gave a decree for the amount claimed.

Lighting Complaints at Clowne.—The Chairman (Mr. W. H. Gregory) reported at a meeting of the Clowne (Derbyshire) Parish Council recently that a deputation from the Council had had an interview with the Commercial Manager (Mr. Dewick) of the Shireoaks Colliery Company with respect to the unsatisfactory gas supplied for street lighting from the Company's works at Southgate. They were told by Mr. Dewick that the Company proposed making certain improvements at the works, which would probably meet the complaints. Mr. Dewick, however, declined to reduce the price of gas from 5s. to 4s. 6d. per 1000 c.ft., as asked by the Council.

MISCELLANEOUS NEWS.

THE THERM INQUIRY.

Third Day.

The proceedings before the Committee appointed to inquire and report as to the method of charging for gas on a thermal basis were resumed at the Institution of Mechanical Engineers, Storey's Gate, Westminster, on Tuesday, Jan. 9. The proceedings at the first and second days' sittings were reported in the "JOURNAL" for Dec. 20 and 27, pp. 743, 804.

The Chairman of the Committee is Sir CLARENDON G. HYDE; the other members being Mr. ARTHUR BALFOUR, J.P., Sir JAMES MARTIN, J.P., Mr. W. J. U. WOOLCOCK, C.B.E., and Mr. A. PUGH.

Evidence was given by representatives of the Railway Companies' Association and the National Gas Council.

ANOTHER PROTEST.

As on the occasion when the Committee held their first sitting, there was an interruption from a member of the audience, who said that he wanted to make an observation with regard to the public. He was Mr. Higgins, of No. 30, Stanley Place, S.W. 1, and said that he was at one time a gas consumer, but was not now. The Chairman told Mr. Higgins that, as he was not a gas consumer, and did not represent the public, he must sit down. The Chairman repeated his request several times before Mr. Higgins complied.

The CHAIRMAN then announced that the Committee had sent circulars to over 102 boroughs and district councils, and had received about 50 answers; but inasmuch as the New Year had intervened, the others had probably not had time to reply, and possibly the Committee would hear by the next meeting whether any desired to be represented. The Islington Borough Council did not wish to give evidence, but suggested that the old method of charging should be reverted to. The Staines Urban District Council protested against the present method of computing the charge for gas, but did not propose to be represented. The Wealdstone Urban District Council did not desire to give evidence, but considered that the old method of charging should be reverted to. The Friern Barnet Urban District Council replied in a similar manner. Replies had also been received from the Chambers of Commerce at Glasgow, Liverpool, Sheffield, and Newcastle-on-Tyne, and from the Association of Local Authorities not Owning Gas Undertakings, at Swansea; and they did not propose to offer evidence. In the case of the Newcastle-on-Tyne Chamber of Commerce, they only objected on the ground that the price of gas was raised at the time the therm system was introduced.

RAILWAY COMPANIES AND PRESSURE.

Mr. J. TRIFFITT (Assistant Engineer of the North-Eastern Area of the London and North-Eastern Railway Company and member of the Railway Companies' Gas Committee) then gave evidence on behalf of the Railway Companies' Association. His evidence was directed to show, in the first place, that the principle of the thermal basis of payment was satisfactory, and should be retained.

In reply to questions by the Chairman, Mr. Triffitt said that some railway companies produced gas for their own use, and sold it to their tenants and to traders in close touch with them, but also bought gas from gas undertakings. Continuing, he said that, although the companies agreed with the principle of the thermal basis of payment, they contended that it must be coupled with safeguards for the consumers. Such safeguards were fully dealt with in the Fuel Research Board's Reports; but they were only partially, and not fully, incorporated in the Gas Regulation Act. Gas consumers were, therefore, suffering loss, or might suffer loss. The Gas Referees were not fully enforcing the safeguards that were incorporated in the Act. Therefore, consumers might be suffering further loss. The increased prices authorized by the Board of Trade were open to criticism, and better safeguards as to calorific value and pressure were essential in the interests of the consumers. With regard to pressure, in the first instance the Fuel Research Board had recommended that the minimum pressure should be measured at the exits of the consumers' meters. He believed the gas companies had rather objected to this. The matter had been debated at certain meetings of the Fuel Research Board; and it was agreed, at the instance of the gas companies' representatives there, that it should be in a pipe 2 in. or upwards in diameter.

The CHAIRMAN remarked that this would not affect the question of the supply of gas by the therm.

Mr. TRIFFITT said it would. Unless one obtained the commensurate pressure for gas of a certain calorific value, consumers would suffer loss through this. The railway companies said that 20-10ths pressure was the requisite pressure for a 500 B.Th.U. gas, and for a 350 B.Th.U. gas it should be very much higher. The railway companies had expressed their views to the Fuel Research Board, and in one of their reports the Board had recommended that the gas undertaking was to supply gas at such a pressure that under normal conditions of supply and equipment there should be a pressure of not less than 2 in. of water on the gas at the exit of the consumers' meters. In view of the fact that the majority of service pipes were less than 2 in. in diameter, it was remarkable that the Board of Trade had whittled the recommendation down to a minimum pressure of 2 in. in any main or in any service pipe having an internal diameter of 2 in. and upwards, instead of at the exit of the consumer's meter. It was even conceivable that the prescribed pressure might be provided at one end of a service pipe and not at the other end near the meter, and that, even under these conditions, the requirements of the Act would be complied with. The public were entitled to a pressure commensurate with the calorific value. The safeguards in the Gas Regulation Act for the purpose of protecting consumers' interests in respect of calorific value were moderately good if fully enforced; but they would have been much better if the Act had made it compulsory upon all gas undertakings to provide a calorimeter which would continuously measure and record the calorific value as supplied—this being the recommendation of the Fuel Research Board.

The CHAIRMAN pointed out that the evidence before the Committee was that at the moment it was doubtful whether there was a scientifically accurate recording calorimeter.

Mr. TRIFFITT replied that there were recording calorimeters in use to-day. Continuing, on the question of pressure again, he said there was no guarantee that the pressure would be sufficient to drive the gas through small service pipes, which there would have been had the Act prescribed that the minimum pressure should be at the exits of consumers' meters. Large consumers who had to provide their own distributing services were in a worse position, as there was no probability of there being a proper and commensurate pressure at the burning appliances at very long distances from the meter, unless the gas undertaking supplied a pressure much in excess of the prescribed minimum. Railway companies were in this position. There was no doubt that pressure, fluctuating as it does under present conditions, was very largely responsible for waste and bad lighting. The prescribed minimum pressure of 20-10ths was really the minimum pressure for efficiency at the terminals for gas of about 500 B.Th.U. It was, therefore, the lowest possible under conditions the most favourable, and for this reason must vary very considerably to cover other conditions. The next safeguard was with regard to adjustment of apparatus. The Fuel Research Board had said that burners should be adjusted or replaced at the first declaration of the value of the gas to be supplied under the Act, and also when an alteration of the declared value was made. There was no obligation on the part of undertakers on the first declaration to adjust or replace burners. Consumers whose burners were unsuitable for the calorific value as first declared would undoubtedly suffer inconvenience and loss if they did not, at their own cost, replace these burners by others of a suitable type. Perhaps this was one of the reasons why the public were complaining. Although the Gas Regulation Act contained certain safeguards to the public, the Gas Referees were not fully enforcing them. Reverting to the question of pressure, he said that the Gas Referees had prescribed that the minimum pressure should be tested in nearly every case at the gas-works. It was well known that pressure was lost by friction through the pipes. The maximum pressure was at the gas-works; and how any consumer could be protected by a test of pressure at the gas-works, he could not conceive. [This remark met with some applause from members of the public.]

The CHAIRMAN pointed out, as the result of further remarks by the witness, that London had a large number of testing-places.

Mr. TRIFFITT said that might be; but he was speaking more of the Provinces. A test at the works was no criterion of the pressure obtained elsewhere.

The CHAIRMAN said the point was that the pressure ought to be tested at a point distant from the gas-works, so that it might be an effective gauge.

Advocating the use of governors, witness said that railway companies had for many years past recognized that there could be no efficient adjustment of burners without a proper control of pressure, and, therefore, had provided governors in conjunction with efficient burning appliances. As exemplifying the usefulness of governors, he mentioned that a governor had been provided in one of the North-Eastern Company's areas, and within a week he was advised of an economy of 42 p.ct. It was apparent that the Gas Regulation Act did not meet the intentions of the Fuel Research Board—that any change in condition as to the basis of charging for gas should be subject to a proper adjustment for efficiency purposes of burners in consumers' appliances, at the cost of the gas undertakings.

With regard to the price of gas, Mr. Triffitt said that railway companies had not taken any active steps as regards limiting price. They recognized that gas undertakings were entitled to special consideration owing to increased costs arising from the war. They assumed that the Board of Trade would exercise the control which the Gas Regulation Act authorized, and that the Board would be assisted by the local authorities, who were the natural protectors of public interests, and who should closely scrutinize the figures of the gas undertakings when they applied to the Board of Trade for an Order under section 1 of the Act. It was, however, of the greatest importance that the new price should be reasonable both from the gas undertakers' and the consumers' points of view. Mr. Honey, in his evidence, had disclaimed responsibility for fixing the price actually charged for gas. He had pointed out that he was in no way responsible for the original powers to charge; his duty being merely to increase them in the manner prescribed in the Act. Consequently, it must be assumed that, when the time came for amending the price, the Board of Trade might make only such deductions as were authorized under the proviso of section 1 (3); and if this were so, it might be that the Board of Trade would not feel justified in rectifying mistakes, if any, which affected the first price fixed by the Act.

Mr. Honey, he continued, had given particulars of two instances in which he, if he did not fix the price to be charged, had certainly fixed the increased amount to be charged. These two instances might be compared as follows:

YORK:	
Old standard price	2s. 3d. per 1000 c.ft.
Equivalent	5·4d. per therm.
Pre-war actual cost	17·03d. per 1000 c.ft.
Equivalent	2·84d. per therm.
Present actual cost.	49·84d. per 1000 c.ft.
Equivalent	10·38d. per therm.
New price authorized	13·00d. per therm.
GAS LIGHT AND COKE COMPANY:	
Old standard price	3s. 2d. per 1000 c.ft.
Equivalent	7·6d. per therm.
Pre-war actual cost.	
Equivalent.	
Present actual cost.	
Equivalent.	
New price authorized	15·00d. per therm.

The figures were incomplete for the purpose of making a full comparison; but in the one case the original standard price converted into

a price per therm was raised from 5·4d. to 13·00d., or nearly 2½ times, as compared with 100 p.ct. increase in the other. Pre-war, the York Company's standard price was 2s. 3d. per 1000 c.ft., as against 3s. 2d. per 1000 c.ft. in the case of the Gas Light and Coke Company; the difference of 40 p.ct. not being maintained between the new prices. It was stated that in both instances the 1913 price was relative to a 500 B.Th.U. gas; but, notwithstanding this, the conversion into therm price in the York case was in one instance based on a 500 B.Th.U. gas, and in the second instance on a 600 B.Th.U. gas. The gas undertakings were not selling, nor were consumers purchasing, gas per therm in 1913; and this basis for charging had no relation whatever to the standard price per 1000 c.ft. Whether the gas were 1000 B.Th.U. or 400 B.Th.U. per cubic foot was immaterial to the gas undertakings' obligation to give the prescribed illuminating value in 1913, and therefore the cost per therm in 1913 should not be the starting point for building-up a price per therm after 1920.

Before 1914, there was a percentage relation between the actual cost and the standard price per 1000 c.ft. of gas of a prescribed candle power, and after 1920 there should be the same relation between the actual cost and the standard price per therm, provided that, as stated in the Act, the continuation of this relationship was "reasonably required" in order to meet the increases (if any) due to circumstances beyond the control of, or which could not reasonably have been avoided by, the undertakers, which had occurred since June 30, 1914. Obviously, if no addition was "reasonably required"—*i.e.*, if the original standard or maximum price was sufficiently high to cover these increased costs—the original standard or maximum price would continue. It would be absurd to suggest that any standard price fixed pre-war would suffice; but it was quite possible that some of the maximum prices had not yet been exceeded, and it would be interesting to learn whether the Board of Trade were making the same arbitrary increase, spoken of by Mr. Honey, in both standard and maximum prices. It certainly would be very unfortunate if standard and maximum prices were made more incorrect than they were before; and it was difficult to see how consumers could take steps to put the matter right.

It had been said that the Gas Light and Coke Company, in order to pay their shareholders £21,700 additional dividend, had to reduce the price of gas to the consumer by £120,000. Or, in other words, before they could pay an increased dividend of 2s. 8d. p.ct. they had to save in their working £141,000, and then the shareholders might take one-seventh of that amount and the consumer six-sevenths. Also that, on the sale of gas for all purposes, 1d. per therm equalled £601,322. This was very true in relation to a strictly correct standard price. But if the standard price were too high, each penny per therm overcharged would cost the consumers £601,322. The sliding-scale was introduced for the purpose of enabling gas undertakings to increase slightly the old prescribed dividends if and when they, by good management, effected savings—subject, however, to the greater proportion of the savings accruing to consumers. But they were subject to some risks, as, if they exceeded the standard price (a price much less than the maximum price) their dividends were reduced. It was therefore of the utmost importance that the new standard and maximum prices fixed by the Board of Trade should be fair, and that, to enable local authorities, or twenty consumers, as the case might be, to justify any application they might make for an amending Order revising the power of charging authorized by the original Order, the Board of Trade should give them the fullest particulars of the figures and justification they accepted when they fixed the prices of charging in the original Order.

On the question of inerts, witness pointed out that as the volume of inerts in the gas increased, so the pressure must be increased.

The CHAIRMAN said that it did not in fact affect the price to the consumer.

WITNESS replied that it did not.

The CHAIRMAN said that all the consumer had to complain of was that he got an inferior gas, but only paid for what heat he obtained.

WITNESS agreed.

The CHAIRMAN asked whether witness thought each private consumer should be supplied with a governor.

WITNESS did not know what the gas companies would say to such a proposal; but any consumer who did not provide a governor or have a governor supplied was liable to suffer loss.

The most concise evidence on the whole question before the Committee, in the view of the witness, would probably be that: (*a*) The original recommendations of the Fuel Research Board as affecting both gas undertakings and the consumers were satisfactory; (*b*) the original recommendations were not fully and properly incorporated in the Gas Regulation Act; and (*c*) the Gas Referees' protection of consumers' interests was less than the Act authorized.

Dealing with the Fuel Research Board's suggestion that every supply district above a certain magnitude ought to be provided with one or more gas examiners, and, if necessary, a staff of inspectors whose whole time should be directed to looking after the interests of gas consumers, and that the smaller gas supply centres should be grouped into districts for these purposes, witness said the Act certainly authorized the appointment of gas examiners, but not the staff of inspectors. The provisions in the Act in regard to gas examiners giving notice to the undertakers that a test was to be made (in cases where the testing-place was not on the works) did not indicate the "paramount importance"—the words used by the Fuel Research Board—of protecting consumers' interests. The Fuel Research Board, in commenting upon the intermittent tests, and notice having to be given to the gas undertaking of the exact day and hour of the official test, added that they had had before them clear evidence in certain cases that only during the brief period of the pre-arranged test was the gas up to the required standard, and that at all other times it was much below that standard.

The Gas Referees' prescription applying to night tests were very unsatisfactory from the point of view of railway companies, as they usually provided that not more than two testings in each quarter may, but need not, be made between the hours of midnight and six o'clock in the morning. Railway companies required efficient night lighting, and both calorific value and pressure should be maintained between the hours mentioned. But, without casting any reflection upon any gas undertaking, the limitation of night testing could not be in the interests of the consumers, and particularly those who were paying for therms supplied during these hours.

Mention had been made in evidence before the Committee that small companies could not stand the cost of constant examining. To this, witness replied that small companies, and large companies, too, would make the consumer pay the cost of such examining; and it would be well for the consumer to welcome this small extra cost rather than pay much more by reason of insufficient examining. It would naturally be asked, said witness, to what extent had railway companies suffered from the laxity of control or the non-compliance with statutory obligations by the gas undertakings. If they had so suffered, it must be to a very much less degree than had been the case with the small consumers, owing to the control railway companies themselves exercised. Railway companies, having their special organizations for controlling light and heat costs, were constantly introducing new conditions, which made it very difficult to estimate any loss owing to failure to maintain the declared calorific value. This inquiry would result in a very great economy, and save considerable sums of money to gas consumers, if, through it, consumers were taught properly to control and use gas. Although the sale of gas by the undertakings might be greatly reduced by such control, it would be increased again by reason of the increasing confidence of the public. Local authorities had not fully realized their responsibilities under the Gas Regulation Act, and probably thought that the responsibility really lay with the Gas Referees. It was improbable that a gas examiner called upon from three to thirteen times a quarter to carry out a duty on the lines prescribed by the Gas Referees had any real interest in the work. Controls should be automatic and continuous where possible, and supplemented by inspection of the gas examiners. He had been told that some authorities had not appointed a gas examiner.

The public complaint as to gas bills was no doubt largely due to the material increase in costs caused by the amended charging powers; but where there was great delay in making gas undertakings subject to the terms of the Act, there might be reasons why costs were increased, of which the public had good reason to complain. In saying this, he did not wish to cast reflection upon any particular undertaking.

The Board of Trade, the local authorities, or the gas undertakings should give some assistance to the public to enable them to understand the new basis of charging. The Sheffield or Bristol form was suitable for this purpose; and as many gas undertakings might have, by their first declared calorific value, very drastically affected the efficiency of consumers' appliances without any obligation upon themselves to adjust such appliances until they at a much later date (perhaps years after) altered the first declared calorific value, it would be proper that they should be compelled to give some kind of notice and assistance to consumers so affected. Much more than this was really needed if fuel economy, as advocated by the Fuel Research Board, was their object, and some authority should instruct the public how gas could be economized. It would be better for consumers to have to pay a higher price if they could reduce costs by using correct appliances for burning gas.

Replying to questions by Mr. PUGH, Mr. Triffitt said that in York the Gas Referees prescribed thirteen tests per quarter, and that they were no criterion of the value of the gas supplied from hour to hour. He wanted a calorimeter that would continue to record.

Asked whether the supply of governors to consumers was a practical proposition in his view, witness said he was convinced that if the gas undertakings would supply governors, and would supply gas to the satisfaction of the consumers, they would, in the long run, benefit. He admitted, however, that if they supplied governors to-day their consumption would fall, and consumers' gas bills would be reduced. Replying to a further question, he said he did not wish to be unfair to gas undertakings. When paying on the cubic foot basis, if the consumer did not control his pressure, he was paying for more gas.

Mr. WOOLCOCK asked witness which of the four safeguards he had enumerated was peculiar to the therm method of charging.

Mr. TRIFFITT said all of them were.

Mr. WOOLCOCK referred to pressure and the use of governors, saying that these two, out of the four, were not peculiar to the therm system, but common to both.

WITNESS agreed.

Mr. WOOLCOCK then asked what exactly was wrong with the method of fixing the basis price for gas under the therm system.

WITNESS replied that the cost of manufacturing gas per 1000 c.ft. in 1913 was ascertained; and if in 1919 they ascertained the cost of making the same kind of gas, they would get an increase which was an increase per 1000 c.ft.

The CHAIRMAN took it that the point was that the Board of Trade ought to have examined what the calorific value of the gas was in 1913, what it cost to make gas of that value, and then build-up the price on the additional cost of making the same kind of gas.

WITNESS agreed. He would have made the new price at York less than that fixed; but the Board of Trade had more information than he had, and it was possible that the price was correct. But if the price anywhere were too high, it was a serious matter.

Mr. WALTER CULLINGFORD GOODCHILD (Gas and Hydraulic Assistant to the Mechanical Engineer, London, Midland, and Scottish Railway, Midland Division) then gave evidence. The railway companies' objection was that the Act had not yet been so generally applied to municipal undertakings as to companies. There was at least one undertaking which had neither an illuminating nor a calorific power standard, and supplied gas which could only be used in an incandescent burner, and yet denied customers an adequate pressure.

In reply to the CHAIRMAN, witness said that the railway companies favoured the introduction of the therm system. Gas of a very low calorific value was being supplied at the present time at Nuneaton; and it showed to what the public might be liable unless something was done to enforce the Gas Regulation Act throughout the country. At Nuneaton, the price was 3s. per 1000 c.ft., *plus* 40 p.ct. This did not look a bad price on the thousand cubic feet basis; but as soon as one took into account the average calorific value, which was about 285 B.Th.U.—it varied as much as 88·5 B.Th.U. in 18 hours—the price worked out to 17·7d. per therm. Towns in the neighbourhood of

Nuneaton, supplying gas on a therm basis and of reasonable calorific value, charged prices varying from 8½d. to 11d. per therm.

Continuing, witness said that in 1921 the gas consumption of the old Midland Railway Company, which was taken from a number of gas undertakings throughout the country, was 2·6 p.ct. less by volume than in 1920; but the average cost per 1000 c.ft. was increased 7·6 p.ct., so that the total amount spent was 5 p.ct. more. This reduction in volume of gas consumed was due to the strict watch maintained by the technical staff by: (*a*) Weekly or monthly readings of the meters; (*b*) the regulation of pressure by governors; and (*c*) the adjustment of burner nipples to suit the calorific value of gas supplied by each undertaking. During the war period calorific powers were reduced, and also pressures, which involved considerable enlargement of burner nipples to obtain the same heat units per hour for any appliances. Since the operation of the Gas Regulation Act, pressures had been increased (although less in London than elsewhere), and calorific values were higher. Therefore, unless the size of nipples had been reduced, an excess of gas was used, for which little extra duty was obtained. Witness suggested that the complaints of the general public would be reduced by: (*a*) Instruction in the method of reading gas-meters (the desirability of recording the weekly consumption being emphasized); (*b*) by the setting of problems in the elementary schools involving the use of the therm; (*c*) by a standard form of account showing the consumption in cubic feet and its equivalent in therms; (*d*) by the installation of governors in order to secure constant pressure; and (*e*) by the enforcement of section 1, sub-section 4 (*b*) of the Gas Regulation Act. He agreed with Mr. Triffitt's evidence with regard to pressure, saying that the 20-10ths minimum at the outlet of the meter would be a satisfactory pressure.

With regard to making compulsory on all gas undertakings the provisions of the Gas Regulation Act, witness referred to one case where his Company used gas supplied by a gas undertaking not supplying on a thermal basis, and were subject to any calorific value that the gas undertakers cared to send along. His Company would like to be on the same footing in this town as in others. During the night the pressure dropped to about 7-10ths, which had to be used in burners which admittedly could not properly burn gas at less than 20-10ths pressure. It was the lighting of a siding. Obviously if the Company had to maintain the lighting during the midnight hours with 7-10ths pressure, they had to adjust the burners to that pressure, and when the pressure went up, during the day, to 20-10ths and 25-10ths, the burners were consuming more gas. However, a governor had been installed; and he handed-in a table showing the improvement effected by its use.

In reply to questions by Mr. BALFOUR, witness said he thought that the therm system of charging should be made compulsory throughout the country. Asked whether there was an efficient governor which could really be used by a private consumer without incurring too great cost, he replied that he should say that the ordinary half-inch governor would cost about 30s. or 35s. at the present moment. He believed it would be found useful; and the saving effected would soon cover the cost of the governor.

Mr. BALFOUR asked whether witness would go so far as to say that it should be compulsory to have a governor.

WITNESS thought so—as an ideal condition. If gas companies could come to some arrangement with consumers to pay half the cost, he did not see why, in the long run, both should not benefit.

Sir JAMES MARTIN asked whether witness thought that the small gas consumers in London could afford to put in a governor costing 35s.

Witness replied that they very often used a lot of gas.

When it was pointed out that it was a considerable sum to ask consumers to add to their heavy charges of the present day, witness said gas companies might in some cases meet the problem by district governing. He expressed the opinion that district governing in London would be a difficult matter, owing to the large number of mains.

In reply to the CHAIRMAN, witness advocated that the governor should be at the outlet of the meter, as near as possible to the point of consumption.

This concluded the evidence on behalf of the Railway Companies' Association, and witnesses for the National Gas Council were then called.

EVIDENCE OF PROF. COBB.

Prof. J. W. COBB (Livesey Professor of Coal, Gas, and Fuel Industries, Leeds University) said he had supervised investigations, carried out by a Joint Research Committee of the University of Leeds and the Institution of Gas Engineers, into the relative efficiencies obtainable from grades of gas differing in calorific value or chemical composition. They took up this subject at the end of 1916, because they believed that experience gained during the war, and the increasing recognition of the necessity to exercise economy in the use of coal supplies, would mean that the illuminating standard for gas would never be revived, and that the gas industry might be allowed to develop the most efficient and economical methods of gas supply, having regard both to its manufacture and utilization. This freedom of choice had been denied to the industry by the necessity to conform to the illuminating standard. An intelligent use of such freedom, if it was accorded, demanded far more precise knowledge than was available in any quarter as to the efficiency of different grades of gas in use. This was the information which the gas industry desired to have, and which the investigators set out to acquire. The results were embodied in three reports issued in 1918, 1919, and 1920 to the Institution of Gas Engineers. They were before the Fuel Research Board in their consideration of the recommendations they were making at the request of the Board of Trade for the framing of the Gas Regulation Act. The grades of gas examined varied from one with a calorific value of 615 B.Th.U. per c.ft. (a rich coal gas) to one with a calorific value of 314 B.Th.U. per c.ft. (blue water gas), with some excursions below this limit. They investigated the effect of altering the calorific value by making up a large number of mixtures, starting with a rich, straight coal gas, and adding to it water gas, or, in some cases, producer gas or inert constituents. Any one of these additions gave a mixture of lower calorific value. The efficiency of the mixtures in use was tested for typical purposes which, *in toto*, would cover a very large proportion of the total gas consumed. The appliances used were such as to test points which might be of importance. The first was a ring burner for water heating. This represented the use of gas for carrying out an operation which did not necessarily require anything more than a low temperature. The gas-fire was taken as representative of medium temperature heating, and one in which the emission of radiant heat was all-important. The upright burner, with incandescent mantle, was taken as typical of an important high-temperature use in which a certain kind of radiation was necessary The appliances were all of a normal type and of well-known makes, and adjustments were made by means of the ordinary gas-tap and air-slide, excepting that in investigating some of the lowest grades of gas, the nipple of the burner was opened out a little in order to allow of the delivery of the proper number of heat units without raising the pressure above the normal (1·5 to 2 in.)—this, of course, being necessary because a greater volume was required. Prof. Cobb pointed out that the results did not show what efficiency it might be possible to secure with gas of this or the other grade in an appliance specially designed and suitable for gas of that grade, but indicated the efficiency which was obtainable in use with apparatus now normally employed and supplied.

Giving the results obtained, he said that in the tests made on water heating, an ordinary ring burner was used, and all the gases tested showed the same efficiency—*i.e.*, so long as the heat units were delivered, the heating effect obtained was the same, whatever the calorific value of the gas. Two cubic feet of 300 B.Th.U. gas would do the same as 1 c.ft. of 600 B.Th.U. gas. For this particular use even a producer gas of 130 B.Th.U. per c.ft. was utilizable with the same efficiency as the richer gases.

With regard to gas-fires, a normal type of fire was employed; the calorific value being reduced in stages from 600 to 300 B.Th.U. by the admixture of blue water gas. No alteration in efficiency was perceptible so long as the same number of heat units was delivered. The efficiency determined in this case was the radiant efficiency—*i.e.*, the proportion of the total heat of combustion of the gas which was radiated from the fire into the room. It was 44 p.ct. of the gross calorific value. The radiant efficiency was determined for purposes of comparison, and not the total efficiency, which would include the heat given up by the fire by convection and conduction in addition to that radiated. The total efficiency would be some 20 p.ct. higher. The radiant efficiency was the one determined because it was there, if anywhere, that differences in behaviour of the gases tested might be expected to appear. It was proved, too, that the calorific value might be brought down to 350 B.Th.U. by the addition of inert nitrogen before there was any appreciable drop in the thermal efficiency.

For lighting tests, an ordinary upright burner of well-known make was used. The results obtained for lighting could not be stated quite so directly and simply; but in this case, as in the others, a large number of tests was made, the calorific value being reduced by admixture with water gas or with inert constituents. It was not possible to state a percentage thermal efficiency for lighting in the same way as for heating; but the results had been related to a standard satisfactory performance. The performance of a gas was regarded as satisfactory if, with the ordinary "C"-sized mantle, using a pressure of 1·5 to 2 in., 70 c.p. could be obtained, and if not less than 30 c.p. were obtained for every 1000 B.Th.U. supplied—*i.e.*, that the gas would give a certain illumination, and could give it with a certain degree of efficiency. Diluting the rich coal gas with inert nitrogen, there was no appreciable drop until the calorific value had been lowered to 450 B.Th.U.; and it could be lowered to 400 B.Th.U. without going below the provisional standard of performance just specified. The calorific value might be brought down with blue water gas to 425 to 450 B.Th.U. and the standard maintained. Below these limits, the lighting performance fell away more rapidly. With reference to lighting with these lower grades of gas (425 B.Th.U. downwards), particularly those made with admixture of water gas, he emphasized again that it was not known what lighting efficiencies might be obtainable in appliances worked-out to deal with them specially. The investigators were immediately concerned with finding out what could be done with the appliances now made and supplied; and the tests described had been limited by that consideration.

Summarizing, he said it would be plain from these results, obtained in studying different gases (offering a range of composition and calorific value) in their principal applications, that the evaluation of a gas for use could best be made in terms of the potential heat units which it carried. He need, therefore, hardly say that when it was suggested by the Fuel Research Board to use the heat units supplied in gas as the basis of charge, the idea appeared to him to be perfectly sound and practicable; and he thought so now. The therm was, of course, simply a convenient multiple of the long-established and generally employed British thermal unit.

On the question of the adjustment of appliances, it was impossible to make a brief and unqualified statement; but the following might be taken to represent generally the experience of himself and his colleagues in making their experiments. As regards lighting burners, which he took as being the most sensitive—more so than the heating burners—the average burner of good make, adjusted carefully for a gas of 500 B.Th.U. calorific value, could be readily and easily adjusted to burn efficiently a gas up to 550 or down to 450 B.Th.U.; the pressure being the normal 1·5 to 2 inches. The easy adjustments referred to were those of the tap and the air-slide. If the alteration on an assumed initial 500 B.Th.U. was greater than this—*i.e.*, above 550 or below 450 B Th.U., the necessary adjustment would be more difficult.

The CHAIRMAN said that the gas supplied by three companies in London was of a calorific value of 475, 500, and 560 B.Th.U. respectively, and asked whether apparatus which would deal with the 475 B.Th.U. gas could be adjusted to deal with the 560 B.Th.U. gas in the manner indicated.

Prof. COBB replied that if the Chairman meant that the initial gas supplied was 560 and was changed to 475, he was getting towards the limit. In this event, he believed that, in the case of a number of appliances, somebody would have to be called in from outside to make the necessary adjustment of the nipple.

The CHAIRMAN said the question resolved itself into this—that the ordinary apparatus bought from the ironmonger could in most cases be adjusted.

Prof. COBB replied that he preferred to state a limit of 100 B.Th.U. —*i.e.*, 50 on each side.

Mr. BALFOUR asked whether witness thought there was considerable room for more standardization of fittings.

Prof. COBB said he supposed so, though he was against over-standardization.

Mr. PUGH asked whether the charge was based absolutely upon the thermal value, and was not merely a conversion from a charge on a quantity basis to a heat basis.

Prof. COBB said it was based entirely on the thermal value.

Asked whether the recommendation of the Board of Trade Committee—that no limitation should be placed on the proportion of incombustibles in the gas—was not a somewhat sweeping one, witness said he did not think so. That was essentially the recommendation he himself had suggested in evidence. It was a very wise thing to do.

In reply to a question as to whether he considered the present system of checking calorific values was satisfactory, witness said that lay with the Gas Referees; but incidentally he expressed the opinion that the Gas Referees were doing well in not introducing prematurely the requirements as to the use of recording calorimeters. They were doing well to hold their hands. It was his opinion that if the recording calorimeter were introduced by force in the country now, it would mean that both producers and consumers, at different times, would have reason to complain.

Mr. WOOLCOCK asked whether there was a practical recording calorimeter at the moment.

Prof. COBB believed Prof. Boys was confident that he had got his new instrument to a satisfactory condition. There were also one or two others under test.

Mr. WOOLCOCK asked if Prof. Cobb thought that it would be unwise of the Committee to impose on the gas undertakings a recording calorimeter on which, possibly, legal action might have to be taken, in the present state of development of the calorimeter.

Prof. COBB said that was his opinion. On the question of the standardization of apparatus to deal with a particular strength of gas, the suggestion which had been made in this direction could be usefully carried out. Mr. Woolcock raised the question that this apparatus would have to deal with a gas which varied as much as 50 B.Th.U., although the average thermal value over a given period might be in accordance with that prescribed. To this Prof. Cobb replied that the variation of gas at the works was more limited now than before the Act came into operation, and that the existence of the fact that the gas-fire was not performing so satisfactorily for half-an-hour during a quarter would not be of very great importance.

EVIDENCE ON BEHALF OF APPARATUS MAKERS.

Dr. HAROLD HARTLEY (Gas Research Fellow of Leeds University, and Chief Chemist to Radiation, Limited) said the greater portion of the firm's business was the supply of apparatus direct to gas companies; but they also supplied to ironmongers, &c. He demonstrated to the Committee a Radiation standard gas-fire, pointing out that the firm arranged that all the apparatus they manufactured was such that adjustments could be made for the efficient burning of gases of calorific values varying from 350 to 600 B.Th.U. He explained that the service obtained from a piece of apparatus was determined by the heat energy supplied to the burner and the efficiency of the apparatus. After expressing the view that the sale of gas solely by the 1000 c.ft. measure was not in the interests of the consumer, as it gave no indication of the service obtainable with the fuel, and that the sale of gas on the heat-unit basis ensured that the consumer need only pay for service rendered, he said it was not the practice, nor was it desirable, that apparatus should pass from the manufacturer to the consumer without adjustment *in situ*. It was not possible to specify the conditions under which a piece of apparatus would be used; and for this reason the manufacturer supplied easily-adjustable regulators on his appliances. Instruction cards were prepared by the firm in regard to their apparatus, for the use of fitters and users. He demonstrated to the Committee the flame which he regarded as most desirable, and showed the device which enabled the user to cut-down the pressure if it were too high.

In reply to a question raised by the CHAIRMAN as to the possibility of waste occasioned by the change in the supply during the rush hours, Dr. Hartley said that unless the consumer took care of his appliance he might get a bigger duty if pressure went up. He would not go so far as to say there would be waste. With regard to gas-cookers, it was necessary to educate consumers to the fact that the flame should not go beyond the edge of the pan or vessel used, and he said that this was continually done. Continuing, he said that the fixed-nipple cooker still largely used would not require attention on the part of the gas company provided such changes of calorific value as occurred did not exceed 10 p.ct. either way from that prevailing when the appliance was fitted. Wastage due to carelessness on the part of the operator represented a by no means insignificant part of his total gas consumption. This wastage, expressed in terms of heat units, was not affected by the calorific value of the gas. A gas control tap was an adjunct of all gas-consuming appliances, and it was to the interest of the consumer to use the tap and prevent waste. The efficiency of domestic heating apparatus was not determined by the calorific value *per se* of the gas supply. The efficiency of some types of such apparatus was determined by the hourly supply of heat units. If, after adjustment *in situ*, a variation occurred in the rate of supply of heat units, due either to change in the calorific value or pressure, then a 10 p.ct. change in the rate of supply of heat units would not produce a greater change than 1¼ units in the efficiency figure—*i.e.*, about 2 p.ct.

Asked whether it was within his knowledge that the calorific values in London during the war fell very considerably, Dr. Hartley said he did not think they fell beyond the 10 p.ct. limit.

With regard to standardization, from the manufacturers' point of view this was not desirable, because they would be restricted. As to the use of a governor, that would only ensure that the consumer had a defined maximum. If the governor were set to 20-10ths, and the pressure dropped to 17-10ths, the governor would not bring it up.

The CHAIRMAN said the point was that the consumer was faced sometimes with 30-10ths. Would the governor deal with that?

Dr. HARTLEY said it would deal with it so far as the particular point at which the governor was placed was concerned, but not necessarily so far as the particular appliance was concerned.

Answering further questions—he did not think that, from the point of view of the ordinary householder, the varying of the pressure within the area was very great. So far as his experience as a private consumer was concerned, he had never felt the necessity for a governor; and he was quite a large user of gas-consuming appliances. As a governor would only deal with the point at which it was fixed, if the matter were pressed to its logical conclusion, there must be a governor on every piece of apparatus. The results of varying pressure by the gas company would not necessarily prejudice the consumer; and he handed in a table showing the results of varying pressure on the efficiency of a boiling burner, to illustrate that a big change in pressure did not result in a marked difference in the efficiency obtained from the appliance. He also gave figures relating to a gas-fire and a gas-heated water circulator.

Effect of Variation in the B.Th.U. Available per Hour on the Efficiency of a Boiling Burner.

Hotplates.—The following results are typical of the type of variation obtained with boiling burners, such as are supplied on cooker hotplates, and as loose boiling burners.

B.Th.U. Available per Hour.	Efficiency.	Pressure. Inches-Water.
	P.Ct.	
6,144	59·4	15–10
7,256	57·6	20–10
8,236	56·2	25–10
9,220	54·6	30–10
11,124	52·0	40–10

The particular burner tested was designed to be used at a consumption of 8000 B.Th.U. per hour, and allowed of ½ gallon of water being raised to boiling point in from 10 to 11 minutes.

Effect of Variation in the B.Th.U. Available per Hour on the Radiant Efficiency of a Gas-Fire.

The following table gives the results obtained from a series of tests made with a typical gas-fire, the change in the supply of heat energy supplied to the fire being brought about by change of pressure:

Hourly Consumption B.Th.U. per Radiant.	Radiant Efficiency, Gross Calorific Value.
1200	43·9
1400	45·4
1600	46·8
1700	47·5
1800	48·3
1900	48·6
2000	48·7
2100	48·5
2200	47·7
2400	46·1
2600	44·7

The normal rating of this fire was 1900 B.Th.U. per radiant per hour. The fire was of a nine radiant size, so that gross rating would be 17,100 B.Th.U. per hour. When burning more than 2000 B.Th.U. per radiant per hour, flame was visible above the top of the radiant.

Effect of Variation in the B.Th.U. Available per Hour on the Efficiency of a Gas-Heated Circulator.

This table showed the variation in efficiency of a typical circulator for change in the B.Th.U. consumption.

Consumption B.Th.U. per Hour.	Efficiency, Gross Calorific Value.
10,000	80·7
12,500	81·0
15,000	80·1
17,500	80·6
20,000	80·8
22,500	79·8
25,000	79·1

The rated capacity of this circulator was 20,000 B.Th.U. per hour, and it dealt satisfactorily with a 25 p.ct. overload.

Dealing again with the question of standardization of apparatus for a particular gas, witness said that there might be gas supplied in various districts varying from 350 to 500 B.Th.U., and enormous stocks of apparatus would have to be carried. It was better to have an adjustable nipple. If not, the manufacturer would have to leave his apparatus unfinished for the gas company to put on the necessary nipple; and even this would not ensure that the apparatus was absolutely correct for the pressure at which the gas was supplied by a particular company, because it might vary.

In reply to Mr. BALFOUR, witness said he did not think it was in the public interest to go in for a cheap governor. In regard to his firm's apparatus, whenever an appliance went out to an ironmonger, a gas company, or a private consumer, an instruction card was attached.

Asked by Sir JAMES MARTIN whether the average consumer used this highly efficient apparatus generally, witness said that, when supplying apparatus, both thermal efficiency and ease of use had to be considered. They had to cater for people of different views; and they might prefer an apparatus of lower efficiency but less complicated.

Sir JAMES MARTIN asked whether witness's evidence did not go to

show that, to get economic use of his appliances, a consumer wanted frequent advice as to the proper use of it.

Dr. HARTLEY replied that the apparatus did not alter, and once the consumer knew how to use it he did not want more instruction. At the same time, a good deal of spade work was being done. His firm arranged for competent men to give lectures on efficiency, and those concerned with the fitting of apparatus were told how to deal with it. Gas companies were also continuously supplying literature advising consumers how to use their appliances. There was a great deal of waste because people would not turn-off the burners.

In reply to Mr. PUGH, witness agreed that his firm's appliances would meet practically every range of gas supplied simply by adjustment, and did, in fact, represent standard appliances which could be adjusted. Asked how he would deal with the Nuneaton gas, he said his firm had not endeavoured to legislate for gas so low as that. It was abnormal.

EVIDENCE OF MR. D. MILNE WATSON.

Mr. D. MILNE WATSON (President of the National Gas Council and Governor of the Gas Light and Coke Company) said that from the point of view of the industry the inquiry was welcomed, because the industry felt that suspicion had arisen as to the manner in which their business was conducted, and they were glad to have an opportunity of allaying that suspicion. The therm basis of charge was absolutely fair to consumers, because they were charged only for the heat units actually supplied. He referred to the fact that gas companies had been supplying on a calorific as well as a candle-power basis—a double standard. The Gas Light and Coke Company was the first Company to apply the calorific standard. The illuminating power standard was 14 candles. The illuminating power of gas was practically of no importance at the present time, except for a certain number of flat-flame burners, but they were chiefly used in passages and cellars. In 1909, when the illuminating power went down from 16 to 14 candles, the companies had to supply new burners free of charge; and he believed over a million were supplied in London. The illuminating power of gas at the present moment was about 5 candles. It was not suitable for what he would call lighting a room, but was sufficient to enable a person to find his way about a passage or similar places. The flat-flame burner was practically obsolete from the point of view of obtaining light.

The following advantages, both to the gas undertakings and the consumers, were the result of the method of charge introduced by the Act:

(*a*) Gas undertakings are enabled to declare at their discretion, and without undue formality, the calorific standard most suitable for their district, regard being had both to the needs of their consumers and to the general economic and geographical position of the undertaking. (*b*) Further, they are enabled to vary their calorific standard at any time should a discovery of new methods of manufacture, or the price of raw materials, render a change desirable in order to cheapen the cost of gas. Under the provisions of the sliding-scale, any reduction in cost must operate to the advantage of consumers. (*c*) Gas consumers throughout the country are enabled to compare on a true basis the cost of gas supplied by the various undertakings. There was another advantage, that the consumer did not pay for inerts. It did not pay the company to supply inerts; so that there was an inducement to the companies to reduce inerts and to keep the gas steady. The average quality of the Gas Light and Coke Company's gas was 501 B.Th.U., which showed how closely they had been working, even with their nine manufacturing stations. It was of great importance for those using gas for manufacturing purposes to have a steady gas.

With regard to the criticism as to the infrequency of tests, and of the examiners giving notice to the gas companies before making a test, in the case of his Company there were 2500 tests made every quarter; and they never knew when the examiners were coming. The question of infrequency did not concern those in London. There were about 14 test-stations in the Company's district.

Asked by the CHAIRMAN whether the Company distributed much industrial gas, witness replied that they supplied quite a quantity, but nothing like that in some large manufacturing centres in the North. It was used in London largely for baking and cooking. There were some very big consumers; and they were quite satisfied with the therm.

With regard to the sliding-scale, in the case of the Gas Light and Coke Company, if the price of gas were lowered by 1d. per 1000 c.ft., the price was reduced to consumers by £130,000 a year, and the shareholders obtained an additional £20,000; so that they had to budget for £150,000. If the price were increased to the extent of £130,000 to the consumer, there must be a reduction in dividend of £20,000.

The question had been raised as to the steps taken by gas undertakings to see that the appliances in their districts were properly adjusted to the quality of the gas being supplied on the first declaration, or on any change of the calorific standard. Speaking generally for the industry, he said with confidence that it was part of the ordinary daily business of gas undertakings to ensure that their consumers' appliances were so adjusted as to give the fullest possible efficiency. This was further secured by the fact that the vast majority of gas appliances were supplied through the gas undertakings themselves, and that before they were put into use by the consumers they were properly fixed and adjusted by the gas undertakings' own fitters, or under their supervision. He impressed upon the Committee that the gas undertakings were business organizations, fully alive to the fact that, apart from any statutory obligations, it was to their interest commercially that the consumer should get the best value from the gas supplied. With regard to the appliances on the district of the Gas Light and Coke Company, they were so adjusted that they were suitable to consume a gas ranging between 475 and 500 B.Th.U. with equal efficiency. In addition, it might perhaps interest the Committee to know that, so far as the Gas Light and Coke Company were concerned, the efficiency of fittings and the economical use of gas by consumers was further ensured in the following ways: (*a*) All the Company's inspectors, fitters, automatic collectors and other representatives, whose duties take them to consumers' premises, have most explicit instructions to take careful note of all complaints with a view to having them remedied; any required adjustment of fires or burners being in most cases dealt with on the spot. (*b*) A special staff of lady advisers, who are experts in the use of gas, call upon consumers and instruct them, free of charge, in the proper and most economical use of their gas cooking-stoves, &c. (*c*) Frequent public lectures and demonstrations are given by this staff free of charge.

As to the fact that there was no registration of the number of therms used on consumers' premises, he could not see anything in favour of an attachment to the present meter for the purpose of converting cubic feet into therms, as had been suggested. First, to be of any value, it would have to be made the basis of charge, which would involve the meter attachment being sealed by the proper local authority in the same way as the present meter was sealed. This would be a matter of enormous difficulty and expense at its first installation, and would make any alteration in the calorific value practically impossible. If any attachment was not to be made the basis of charge, then it would be of less value than the present meter card.

Witness did not think that to put a governor on supplies was a feasible thing. His Company had not found it necessary—the tap was the best governor. They had had numerous cases of people who had put on governors and had taken them off again because they had not found them satisfactory—in fact, the governor itself was rather useless. When cooking, a householder wanted a good supply of gas, and to throttle it down, so to speak, would delay the operation which the householder was anxious to perform as quickly as possible. The pressure did not vary very much in the Company's district; it was about 4 in. In regard to the reference made by Mr. Goodchild to a pressure of 7-10ths, a governor would not help that. Again, a governor, to be really useful, would have to be put on every appliance in the house. The provisions in the Act with regard to pressure were sufficient to ensure all the pressure necessary. As to expense, the cost of fixing governors on automatic supplies in the Company's district would be in the neighbourhood of £1,200,000, or about £2 per meter, and interest, upkeep, and amortization would amount to about £150,000 per annum. This, on the amount of gas used by the consumers, 12,000 millions, would mean an additional cost of 3d. on the automatics. The expenditure would be absolutely useless. There were about 517,000 automatics; and the cost would be very much more in other cases if governors were put in. The Company did not supply at excessive pressure, and there had been no complaints whatsoever on this matter.

Replying to the CHAIRMAN, witness said he subscribed to the theory that the less waste the better for the Gas Company, and added that minute instructions were distributed to every householder on how to practice thrift.

The CHAIRMAN said there had been a great deal of complaint and worry about the introduction of the therm, and the Committee, he believed, had formed the opinion that it was due to want of explanation to the public, and that in some cases the price of gas had gone up at the same time. He asked what the Company had done as a preliminary to the introduction of the therm.

Mr. MILNE WATSON said that in the case of his Company the introduction was not accompanied by a rise in price.

The CHAIRMAN, examining a statement handed in to show the increases in the price of gas supplied by the Company from 1914 onwards, and the reductions since the introduction of the therm, said that in September, 1919, the price was raised from 4s. 2d. to 4s. 8d. per 1000 c.ft. This continued throughout 1920, and on Jan. 27, 1921, the price was raised to 5s. 6d. The therm was introduced on May 8, 1921; the price being 1s. 2d. per therm, which was equivalent to 5s. 6½d per 1000 c.ft. The price of 1s. 2d. per therm continued until December, 1921, when there was a reduction of 1d. per therm; making the price equivalent to 5s. 1⅔d. per 1000 c.ft. In September, 1922, the price was reduced to 11d., equal to 4s. 7d.; and later it was reduced to 10d., equal to 4s. 2d., which is the price to-day. Therefore, in the March quarter of 1921 the price was raised by 10d. per 1000 c.ft. The effect of this was felt in the March collection; so that the increase was noticed when the therm was introduced.

Mr. MILNE WATSON said that during the March quarter, 1921, gas was charged per 1000 c.ft. For the June quarter, half was charged at 5s. 6d. per 1000 c.ft. and half at 1s. 2d. per therm (an equivalent price); and for the preceding quarter (March), half was charged at 4s. 8d. and half at 5s. 6d. Therefore, there was a quarter at 4s. 8d. and 5s. 6d., and then a whole quarter at 5s. 6d. In addition, there was the coal strike in the June quarter of 1921, as a result of which the Company had had to pay £500,000 more for coal and oil. They had, however, struggled through without raising the price; so that the consumers were extraordinarily lucky.

The CHAIRMAN said the fact remained that during the March quarter the consumers paid a rate lower than 5s. 6d., and that when the therm was introduced they paid 5s. 6d. They were therefore technically right in saying that there was a rise.

Mr. MILNE WATSON, dealing with the introduction of the therm to the public, handed in a pamphlet explaining it, which had been circulated to all consumers.

The CHAIRMAN raised the point that in the accounts rendered there were so many cubic feet at 5s. 6d. per 1000, and so many therms at 1s. 2d., and no explanation that the one was the same as the other. He agreed, however, that the present form of account was a great improvement. The Company did not show the meter reading, as in the case of the Bristol Gas Company.

Mr. MILNE WATSON said this was on the meter card. Continuing, witness handed in specimens of instructions issued to the staff, to show the Committee what steps had been taken. With regard to educating school children, the Company did this; and he handed in a book containing notes for teachers, which had been sent to every school in London.

The CHAIRMAN said he hoped the London County Council would take notice of it. It did not mean that the teachers would follow it.

Mr. MILNE WATSON replied that the teachers had welcomed the books, which had been published for about eighteen months—practically coincident with the introduction of the therm.

Questioned as to the recording calorimeter, witness said it would be a most desirable thing when ready. Prof. Boys had not finished his; and he did not yet regard recording calorimeters as satisfactory for the purpose of penalty testing.

Questioned as to the origin of the inquiry, Mr. Milne Watson said that, in his opinion, the cause of the whole trouble might be attributed to the fact that the bills for the quarter ended June, 1922, were, on the whole, considerably heavier than those for the corresponding period in 1921, because: (1) In 1922 there was an exceptionally cold spring, while the weather in the same period of 1921 was exceptionally hot; and (2) during the spring and early summer of 1921 the national coal stoppage imposed upon the nation compulsory restrictions in the use of gas and other forms of heat, while in 1922 no such restrictions were in operation. These two reasons would apply equally all over the country, but with particular force to all undertakings like the Gas Light and Coke Company with a very large domestic heating load. It should be noted that increases in bills occurred not only in districts where the charge was by the therm, but also in areas where the charge by cubic feet was still in operation. In 1921 there was a decrease in business in every month of the year except November, when there was a small increase of 1½ p.ct. In 1922, owing to the lower temperature, and the fact that there was no coal strike, there was an increase in business in every month except November and December, when the weather was comparatively mild. The consumption of gas went up and down every day and every month, largely in accordance with the weather. There was an additional reason, which possibly might be peculiar to the Gas Light and Coke Company—viz., the meters in the June quarter, 1922, were read later than usual. This was unavoidable, in view of the fact that the Company had to give three months' notice of their intention to raise their calorific value, and it was not practicable to begin reading the meters until that notice had expired. This had had the effect of making the quarter exceptionally long, which, combined with the other two reasons already mentioned, naturally caused the bills for the June quarter to be heavy. This long quarter was, of course, compensated for by a short quarter immediately following. The Company received a certain number of complaints that the bills for the quarter in question were increased by 100, 200, and 300 p.ct. These, however, were exceptional cases, for which invariably there were exceptional reasons, as, for instance, prolonged illness, increase of apparatus in use, or some other private reason. While in the majority of cases the consumers had only to be interviewed to be completely satisfied with the justice of the charge, there were inevitably a certain number who closed their eyes to what had happened, and to their own domestic reasons which accounted for the increase. If these exceptional increases had been due to the therm, as had been suggested, it would have been natural to expect a general increase of a like amount, whereas the actual figure of increase for the half year was only about 7 p.ct. The suggestion which had been made in the public Press—that the gas undertakings had been able to manipulate the therm in some extraordinary way so as to increase the bills in their districts—was absolutely absurd.

Speaking for the industry as a whole, and particularly for the Gas Light and Coke Company, he said that they were only too ready to take any reasonable step to remove any misunderstanding that might have arisen in the public mind. He was convinced that in a comparatively short time the public would have got so accustomed to this method of charge that no further question will arise. The best method of removing any confusion was for the quantities of gas consumed to be shown on the bills in both therms and cubic feet. This the Company had done in their district for the last quarter, and might account for the fact that they had received, practically speaking, no complaints in respect of the September quarter. Not only the Gas Light and Coke Company, but the undertakings on whose behalf he was speaking, would be prepared to adopt an account on these lines for so long as might be necessary. There was no ground for the suggestion which had been put forward by one witness, that consumers in London were prejudiced by the various companies having different calorific standards. The imposition of one calorific standard upon all the companies would nullify one of the most important provisions of the Act, and would have most serious results. This must either be in the form of needless capital expenditure on plant or in the form of increased cost of manufacture, which would have the inevitable result in either case of increasing the cost of gas. Before the war the calorific strength of gas was not the same throughout the London area, and the actual quality of gas supplied had never been uniform in that area.

As to the statement by one or more witnesses that the prices charged for gas were, and had been, too high, and also that dividends were too high, witness handed in a statement showing that throughout the whole period since 1913 the price of gas supplied by the Company had never increased to anything approaching the increased cost of the Company's principal raw materials. It also indicated that the dividends paid showed a very serious falling-off, and that the Company's reserve funds had been considerably depleted.

The Gas Light and Coke Company.

Fluctuation of Prices—Gas, Materials, &c.—Years 1913–21.

Year.	Average Price of Coal Increase on 1913.	Average Price of Oil Increase on 1913.	Average Wage Increase on 1913.	Price of Materials Increase on 1913.	Average Price of Gas per 1000 C.Ft. Price.	Average Price of Gas per 1000 C.Ft. Increase on 1913.	Dividends Paid. Rate P.Ct.	Dividends Paid. Decrease on 1913.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.	s. d.	P.Ct.	£ s. d.	P.Ct.
1913	—	—	—	—	2 6	—	4 17 4	—
1914	2	46	6	—	2 6½	2	4 15 4	2
1915	24	52	20	39	2 11	17	4 4 0	14
1916	55	249	34	85	3 0	20	4 4 0	14
1917	79	376	56	114	3 3	30	3 14 8	23
1918	115	613	95	175	4 1	63	2 19 4	39
1919	139	309	139	199	4 4	73	3 0 0	38
1920	187	444	180	271	4 8	87	3 0 0	38
1921	177	198	166	152	5 5½	118	4 13 4	4
		N.B.—Price of Gas, December Quarter, 1922			4 2	67		

Carry forward and Reserve Fund, Jan. 1, 1913 . . .	£781,428
Do. Do. Dec. 31, 1921 . . .	235,041
Decrease	546,387

Jan. 6, 1923.

On the question of the adjustment of fittings, he drew attention to Dr. Lander's statement that the appliances in common use were such that with suitable adjustment their efficiency would vary little with changes between fairly wide limits in the calorific value of the gas. His Company's experiments and experience absolutely confirmed this. Moreover, there had been no evidence given that the domestic appliances in common use throughout the country were not at the present time suitably adjusted to the gas being supplied in each particular district; and, in the absence of the most definite evidence on this point, it would be grossly unfair to the gas industry to make any assumptions to the contrary. Witness also called attention to the fact that no large consumers of gas had come forward to complain of the therm as a system. It was noticeable that such large consumers as the London County Council and the railway companies were in favour of the system.

Mr. BALFOUR said that the Committee had been very much struck by some of the complaints of enormous increases in gas consumption which had not been really cleared-up so far as the Committee were concerned, and asked whether some of these were due to leakages.

Mr. MILNE WATSON said he would certainly say they were not; there was nothing to indicate leakages in any of these cases. He did not say that there never had been leakage in any instance, but there was no leakage generally, nor was there in these particular cases. If an examiner discovered a very sudden increase in consumption, he reported it at once. With regard to accounts, the Company received complaints every quarter. It was a most extraordinary thing how some people's consumption varied occasionally, through some reason, such as there being a larger number of people in the house at a particular time; but for the purpose of comparing bills, it was difficult to tax one's memory as to what happened in the house 15 or 16 months previously. Every quarter investigations had to be made with regard to gas bills that seemed to be high; and in practically every case, after the meter had been tested, the Company were able to satisfy the consumers that there was good reason. If bills in general had been 200, 300, or 400 p.ct. higher, there would have been an enormous number of complaints. The percentage of complaints had gone up, especially since the agitation started. They increased in July and August, 1922. What really happened was that somebody said "therms." The Press thought there was something in it, naturally, and correspondence was started. The result was that every person who had a gas bill higher than he had expected immediately thought it was therms. The number of complaints had now dropped back practically to below normal. He agreed with Mr. Balfour that it showed the extraordinary power of the Press. There were 4000 complaints out of 800,000 consumers in two months.

Replying to Sir JAMES MARTIN, witness said that the conversions of the meter readings were checked when brought into the office, and there was no undue percentage of error.

Questioned by Mr. PUGH, witness said that at Nuneaton they were great critics of the therm system. [Laughter.] He then explained the functions of the British Commercial Gas Association, to which most of the undertakings of the country belonged. Both the "B.C.G.A." and the National Gas Council were always striving to make everybody do the best for the consumers. With regard to price, he said the calorific value was declared and the price applied.

Mr. PUGH asked whether, if the calorific standard of the gas supplied by an undertaking were raised, this in itself would be justification for increasing the price to the consumer.

Mr. MILNE WATSON said it might be a justification for reducing it. In June, 1922, the Gas Light and Coke Company increased their calorific standard from 475 to 500, and at the same time reduced the price from 1s. 1d. to 11d. per therm. Price would depend on the cost of making gas at the time. He agreed that there was no real relationship between the calorific standard and the price as between two or three different undertakings.

Mr. WOOLCOCK said there always had been complaints, and the total effect of the enormous Press propaganda was there would be between two and three times as many complaints in one period as compared with another, and that was all.

Mr. MILNE WATSON agreed.

Questioned as to the reference by Mr. Goodchild to the effective use of a governor on a railway siding, Mr. Milne Watson said that a governor was designed to keep pressure at a constant level. In certain circumstances a governor might be a useful thing; but they were not considering exceptional circumstances such as those of a railway company. It would be quite a good thing for them to have a governor; but as to using a governor in every house, the rank-and-file would not thank the companies for them. If governors were installed all over the district, it would really be interfering with the liberty of the subject. The people must have a good gas for cooking, and the pressure must be increased at lighting-up times. If a consumer wanted a governor, he could have one; but if they were put in compulsorily, most consumers would object strongly.

With regard to burners, and the fact that the companies in London supplied gas of different calorific values, witness said he could not see for a solitary moment what disadvantage there was in this difference. If a consumer bought a piece of apparatus from an ironmonger, if he were to get satisfaction out of the appliance it must be adjusted *in situ*. One witness had thought it desirable that all London should have the same standard; but he had not said the same quality of gas supplied or the same composition of gas. Composition was equally important. If it were insisted that all gas companies should make gas in the same way, it would be a perfectly disastrous thing to do, because of the cost involved. He handed in a statement showing a group of the most important companies in the London area, and how the gas supplied by them had varied in the last 22 years, showing that at no time had there been even the same standard.

Answering further questions with regard to complaints, Mr. Watson said that, speaking from memory, after consulting with the staff, he believed the Company had dealt with upwards of half-a-million complaints of all sorts during the year. If apparatus was wrong, the fault was remedied as quickly as possible, because if anything went amiss with a cooker, for instance, the consumer could not use gas. Of course, many of the consumers had a great many appliances. It paid

the Company to keep a good organization for remedying complaints. It was one of the most important pieces of work, and cost a lot of money; but it was the only way to give satisfaction.

With regard to dividends, before the war the dividend of the Gas Light and Coke Company was £4 17s. 4d. The last dividend was £5 4s. There was an extra charge of £50,000 on the Company for dividend, which equalled one-fourteenth of a penny per therm. They could not charge for that. During the war the holders of the Company's ordinary stock sacrificed £1,400,000, and were getting most miserable dividends—as low as £2 19s. 4d.

As to the suggestion that the basic price fixed by the Board of Trade was too high and wanted revision, nothing had happened at present to justify the London County Council taking steps to revise it, because the Company had not paid a dividend which would justify revision. It was perfectly right that the matter should be considered, and it would be judged whether the time had come for revision.

Mr. VALENTINE BROWNE (for the London County Council) asked whether, seeing that under the sliding-scale the Company could pay a higher dividend than £5 4s., witness did not think the price required revision.

Mr. MILNE WATSON replied that this was entirely for Mr. Browne to say.

In answer to a further question, witness said that a very large percentage of appliances in the Company's area had been examined, and a very small proportion required adjustment, because the value of the gas never went outside the range which would result in the appliances requiring absolute adjustment. Asked how long it would take to adjust the appliances in the whole of the Company's area, witness replied that they did not require adjustment.

Mr. BROWNE said he believed the policy of the Company had been to acquire smaller undertakings, and asked whether the calorific value of the gas supplied to the consumers of such undertakings would be the same as that of the Gas Light and Coke Company, or whether it was intended to maintain the calorific standard as taken over.

Mr. MILNE WATSON replied that they always worked to the calorific standard of the Gas Light and Coke Company.

Mr. BROWNE therefore concluded witness thought it desirable to have the same standard calorific value for an area such as London.

Mr. MILNE WATSON said he did not.

Mr. STANLEY H. JONES (Engineer and General Manager of the Commercial Gas Company) said his Company were granted an Order under the Gas Regulation Act in April, 1921, and had adopted a declared calorific standard of 475 B.Th.U. There had been no agitation as the result of the change in the method of charging for gas in the Company's district of supply. The therm system was, in his opinion, a perfectly fair one, both to consumer and company, and was scientifically the most correct method.

With regard to the actual price charged by the Company prior to the war, this was 2s. 4d. per 1000 c.ft., which, for 500 B.Th.U. gas, which the Company then supplied, corresponded with a price of 5·6d. per therm. The price for the whole of the second half year of 1922 had been 10d. per therm, corresponding with a price of 3s. 11½d. per 1000 c.ft.; the increase from 5·6d. to 10d. being 78 p.ct. The high price of 1s. 3d. per therm charged in the last half year of 1921 was entirely due to the coal strike, which had cost the Company £60,000, an equivalent of 4d. per 1000 c.ft.

The consumers' appliances had not had to be adjusted for the 475 gas which the Company now undertook to supply, as the difference in quality compared with the pre-war quality was too slight to affect the burners.

The actual money receipts from the Company's consumers averaged less for the June quarter, 1922, than for the June quarter, 1921. It was vital to the Company's interests to supply gas as cheaply as possible, for the Company were faced with keen competition from two municipal electricity undertakings—at Stepney and Poplar, which supplied the cheapest electricity in London; and if the adoption of the therm system had resulted in any increase in the cost of gas to the consumer, which it most assuredly had not, the Company would soon have discovered it, to their cost, in loss of business.

Replying to Sir JAMES MARTIN, witness said that the light given by a flat-flame burner was not suitable for a living room.

Sir JAMES MARTIN said he could take it that the position was not really satisfactory, so far as the living rooms were concerned to which this gas was supplied, unless there were incandescent burners.

WITNESS agreed,

Mr. PUGH, referring to the statement that the difference in the calorific value of the gas supplied did not make it necessary to adjust the burners, asked whether complaints had been made.

WITNESS replied that there had not. He added that if a consumer had an unsatisfactory appliance, a man was sent round to adjust the burner.

Alderman FRANK PHILLIPS (Chairman of the Gas Committee of the Salford Corporation) said that no doubt the system of charging for gas on the therm basis was perfectly fair and accurate; but the Corporation did not yet intend to apply for an Order. Since Feb. 8, 1918, gas had been supplied in Salford under the Calorific Power Standard Act of 1916. There was no urgent need for the change to the therm basis, in the first place; and in the second place the gas was already supplied on a calorific basis, and tested. For the last ten years there had been peace among the consumers, both inside and outside the borough. The gas was tested by Prof. Dixon (Professor of Chemistry at Manchester University), and his reports were sent to the borough as well as to the authorities of the outside districts. The calorific value supplied was about 500 B.Th.U.

Replying to Mr. PUGH, witness said that he had found it satisfactory to supply on a calorific standard and yet charge on a volume basis, and he was afraid of complaints if the therm system were adopted at once.

In reply to Mr. WOOLCOCK, he said that the people would not understand the new system, and would point out that the meter measured cubic feet. They would be content to go on as now.

Mr. JAMES D. SMITH (General Manager of the Belfast Corporation Gas-Works, and President of the Institution of Gas Engineers) handed in a statement, in which he pointed out that the therm system was necessary owing to the fact that, for most purposes for which gas was used, heat, and heat only, was required, and that the candle power standard was becoming every year more antiquated and useless. Conditions varied enormously in various parts of the country, and a uniform heating standard imposed on the industry as a whole, would, in all probability, satisfy nobody and lead to stagnation instead of progress. It was true that meters still measured the gas consumed by cubic feet; but the registration now only provided the quantity, and the declared calorific value provided the quality. The therm was a definite amount of heat, which was unalterable. He considered the system was fair to the consumer, who was properly protected. Periods of transition were always difficult; but when the gas undertakings and their customers became accustomed to the new conditions, there was no doubt the result would be satisfactory to all concerned, and would lead to a very considerable economy in coal at a time when the saving of coal was one of the highest civic virtues.

The Committee then adjourned.

Fourth Day.

On the resumption of the proceedings yesterday, the first witness was Mr. William Cash (the Chairman of the Gas Companies at Bournemouth and Worthing, a Director of the Croydon Gas Company, and of other companies). He gave evidence in support of the therm system of charging, and showed what a great deal had been done at Bournemouth and at Croydon to educate the public in connection with the introduction of the system.

Mr. Marlow (of the Institute of Chemistry) brought forward a copy of a resolution adopted by the Council of that body and the Board of the Institute of Physics, urging the authorities concerned to adopt a certain definition of the qualifications of gas examiners.

A number of witnesses representing local authorities were also heard. These complained of the introduction of the new system, and of the standard price. Councillor Ball (representing the Sunbury Urban District Council) said there was an impression among consumers in his district that the therm system was responsible for many meters being out of order!

Council.or R. Brown (Southall Urban District Council) said he was anxious to get an official statement that there was no drop in the calorific value of the gas between the point of test and the consumers' meters. This was immediately given without hesitation by Mr. A. A. Johnston (the Engineer and General Manager of the Brentford Gas Company); and Mr. W. J. A. Butterfield (one of the Gas Referees), in his evidence, confirmed it.

A private consumer, of Chelsea, complained of the rise in the price of gas, as a result of which she had dispensed with the use of her gas-cooker, and now used a coal range. In spite of economy in every shape or form, her gas bills went up; and she could get no real satisfaction from the Gas Light and Coke Company. It was clearly to the advantage of the consumer, she said, that the therm system should be done away with, and added: "We mothers do not like it."

Mr. Butterfield went into some detail with regard to the work of the Gas Examiners and the Gas Referees.

Evidence was also given by Sir Dugald Clerk, F.R.S., who spoke of the public advantage in giving the gas industry the fullest freedom to make the quality of gas best suited to particular requirements, and by Mr. George Helps, of Nuneaton. The latter expressed his well-known views with regard to low-grade gas, and made a number of sweeping assertions regarding the gas industry, which called forth a protest from Mr. Milne Watson.

Subsequently the Chairman allowed Mr. Fotterill, of the National Gas Council, to cross-examine Mr. Helps. Some of the questions put called forth, in turn, a protest from that gentleman; but matters were more or less smoothed out, and the Committee adjourned until Jan. 26.

Our usual report of the fourth day's proceedings will be given in next week's "JOURNAL."

CARBON DIOXIDE IN DOMESTIC GAS.

Some Comforting Reflections.

In the course of a letter to the "Morning Post," replying to some remarks made by another correspondent on the subject of the recent Bethnal Green gas poisoning case, Mr. F. D. Marshall writes:

To endeavour to settle the question of the proportionately poisonous qualities of coal gas or of coal gas mixed with carbon monoxide in the form of water gas, many experiments were made on living rabbits; and the writer is in possession of these reports. A Mr. James Loutitt, M.D., M.R.C.S., carried out a series of experiments on the accommodating bunnies. These tests were very thorough, and summing-up his report (which is still available) the result was that "carbon monoxide in the presence of hydrogen is not more poisonous than carburetted hydrogen (coal gas)." Further experiments, again on the useful little rabbit, were made by the distinguished chemists, Prof. Frankland and Mr. Lewis Thompson Wright; the result of their independent report again being "that carbon monoxide was not more poisonous than ordinary coal gas."

The results of the experiments quoted summarize the conclusions of many distinguished men of science in America, France, Germany, and Great Britain. But apart from the scientific trials, we are face to face with commercial facts; and one British firm alone have erected over 711 plants, installed in leading cities and towns all over the civilized world, representing a daily consumption of water gas of over 506,000,000 c.ft., which, in conjunction with the work of their American colleagues, represents a total daily consumption of over 1,470,000,000 c.ft. And this enormous consumption is quite outside the output of the plants from the French, Belgian, Dutch, Italian, Russian, and Japanese manufacturers, which, if the figures were available, would probably double the above consumption.

Chesterfield Price Reduction.—The Chesterfield Gas Committee have agreed that the price of gas be reduced from the first meter readings in January by an amount equivalent to 6d. per 1000 c.ft.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade under the Gas Regulation Act.

Abergavenny Corporation.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4d. per therm, with an additional charge of 1d. per therm for prepayment meter supplies.

Borough of Todmorden.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 8d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

Chesterfield Corporation.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 5s. per 1000 c.ft. within the borough of Chesterfield as existing prior to the extension of the borough in 1892 or within half-a-mile from the boundary thereof; 5s. 6d. at a distance of more than half-a-mile from the boundary, except in the then parishes of Whittington and Brimington; and 6s. in the then parishes of Whittington and Brimington. The prices which they have asked the Board of Trade to substitute for these are 1s. 3d. per therm within the borough and 1s. 5d. outside.

Shepton Mallet Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 2d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 5d. per therm.

The Company also ask for the substitution of "the one-fifth part of one penny per therm" for "one penny per 1000 c.ft." in section 26 of the Shepton Mallet Gas Act, 1902.

SPECIAL ORDERS.

British Gas Light Company, Ltd. (Norwich Station).

Application is to be made by the Company for a Special Order under section 10 to empower them to spend further capital on their Norwich undertaking.

Sevenoaks Gas Company.

A Special Order under section 10 is to be applied for by the Company to relieve them from the obligation to hold more than one general meeting in the year; to enable them to pay interim dividends, to form a special purposes fund, to vary the prices charged for gas according to the purposes for which it is supplied, and to make further provisions regarding the administration of the Company and the supply of gas. Power is also sought to use scheduled lands for gas-works purposes, and to establish profit-sharing.

DECLARATIONS OF CALORIFIC POWER.

Newbury Corporation.—500 B.Th.U. (March 31.)
Pontypridd Urban District Council.—460 B.Th.U. (April 1.)
Wellington (Salop) Gas Company (Oakengates Area).—450 B.Th.U. (April 9.)

GAS FUND CONTRIBUTION.

Under date of Jan. 1, publication has been made of the following Order of the Board of Trade, under section 7 of the Gas Regulation Act, 1920, prescribing the rate of contribution to the Gas Fund for the year 1923.

1.—The rate of contribution to the Gas Fund for the year 1923 shall be three shillings for each million cubic feet of gas sold during the year 1922.

2.—Such contribution shall, on or before April 1, 1923, be paid to the Board of Trade, at Great George Street, London, S.W. 1, by any gas undertakers with respect to whom an Order under the said Act shall have been made, by cheque made payable to the "Assistant Secretary for Finance, Board of Trade," and crossed "Gas Fund Account."

[The rate is the same as last year.—ED. "G.J."]

Reduction in Price at Whitchurch (Salop).—Their Dectors of the Whitchurch (Salop) Gas Company, Ltd., announce a reduction in price of 1d. per therm (equivalent to 5d. per 1000 c.ft.) on all gas consumed after the December quarter meter readings.

Skipton Gas Management Dispute.—In regard to a disagreement between a majority on the Skipton Gas Committee and Mr. J. H. Woodward, the Gas Manager—which recently got so far as a public discussion in open Council and formal recommendation by the Committee that Mr. Woodward be asked to resign by the end of March—the attitude of consumers is indicated as strongly favourable to Mr. Woodward, by the following resolution passed lately by the Skipton Chamber of Trade: "That this meeting of members of the Skipton Chamber of Trade is of the unanimous opinion that the gas supply by the Skipton Urban District Council has been in every way satisfactory while under the management of Mr. J. H. Woodward, and the members further consider that he has been a courteous, capable, and reliable servant of the Council, and that the retention by them of his services as Gas Manager is necessary in the best interests of the gas consumers in the town. Further discussion by the Council on the matter should, in the opinion of this meeting, be open to the public and the Press." Copies of the resolution have been sent to the Clerk of the Council and to Mr. Woodward.

METER PRICES AGAIN REDUCED.

In a circular-letter sent out to gas undertakings at the end of last month, the meter makers announce a further reduction in prices. They say:

In our circular-letter of March 1 last, we intimated that the concessions then made were partly in anticipation of wage reductions which had not at the time been realized. These reductions have recently been obtained; but their effect on costs of manufacture has been minimized to a large extent, owing to the metal markets having advanced substantially during the last few months. Consequently, for meters of first-class quality, the present prices are very moderate in relation to cost; but, realizing that the expansion of business is handicapped in all industries by post-war conditions, and being desirous of stimulating trade, we beg to intimate a further reduction of selling prices and repair charges, in the hope that the loss which that reduction involves will be recouped by a larger output.

The revised terms, which will take effect in respect of all meters, new or repaired, dispatched from their works on and after the 1st inst., are:

Dry Meters—Tinplate Case.

New Meters: Ordinary and Prepayment (Tinplate Money Box)		Repairs (Ordinary and Prepayment) and Conversions.
Rated by "Lights."	New Standard Type.	
List prices.	Discount. 22½ p.ct. off list prices.	Discount. 30 p.ct. off list prices.

Dry Meters—Cast-Iron Case.

New Meters: Ordinary and Prepayment.	Repairs (Ordinary and Prepayment) and Conversions.
10 p.ct. advance on list prices.	20 p.ct. discount off list prices.

Wet Meters—Cast Iron Case.

New Meters.					
Ordinary.				Prepayment.	Repairs (Ordinary and Prepayment) and Conversions.
Common.		Compensator.		Common and Compensator.	
Up to 100 Lt.	150-600 Lt.	Up to 100 Lt.	150-600 Lt.		
Discount. 12½ p.ct. off list.	Advance. 7½ p.ct. on list.	Discount. 7½ p.ct. off list.	Advance. 12½ p.ct. on list.	Discount. 12½ p.ct. off list.	Discount. 20 p.ct. off list.

Wet Meters—Tinplate Case.

New Meters.				Repairs (Ordinary and Prepayment).	
Ordinary.		Prepayment.			
Common.	Compensator.	Common.	Compensators.	Common, and with Compensating Drums.	Other Compensators, including U.V.W.L.
Discount. 12½ p.ct. off list.	Discount. 7½ p.ct. off list.	Discount. 12½ p.ct. off list.	Discount. 12½ p.ct. off list.	Discount. 35 p.ct. off list.	Discount. 25 p.ct. off list.

All subject to 2½ p.ct. for cash monthly. Stamping fees extra. Delivery free.

SUBWAYS FOR GAS-MAINS.

Not Favoured at Manchester.

The Manchester Corporation have decided against a policy of providing subways for service mains and pipes, reports having proved that the heavy cost would not be justified.

In this connection, the Corporation had a report from Mr. William Newbigging, their Consulting Gas Engineer, who said there would, as far as the gas department were concerned, be no saving on initial outlay and capital expenditure, and no saving on maintenance, if subways were provided. Referring to a point raised in regard to the risk of explosion, he had had the privilege of seeing subways in London, Paris, and New York, and had particularly put this question. It was pointed out to him that the subways were adequately ventilated. If the mains did fracture and cause leakages, the gas would escape through the ventilation holes before it became an explosive mixture. He did not attach any serious importance to the risk of explosion in subways. His department rather looked with fear on the idea of the Corporation embarking on any such expenditure as would undoubtedly take place with the construction of subways; and he sincerely trusted that gas-mains would be left out of the subways, if constructed. By far the largest expenditure of the department was incurred in services which were laid from the mains to consumers' premises; and this would not be done away with if subways were provided. The accounts of the department showed that the unaccounted-for gas amounted to only 4 p.ct., which low figure proved the excellent work done in laying the mains.

Mr. L. Holme Lewis, Water-Works Engineer, said his department had, perhaps, a greater objection to subways than the gas department, because the water-mains were larger and heavier.

MUNICIPAL GAS SERVICE.

Chesterfield Engineer Addresses Rotarians.

Addressing the Chesterfield Rotarians upon "A Municipal Gas Service," Mr. H. Davies, the Engineer of the Chesterfield Gas-Works, said residuals were often the deciding factor in the production of cheap gas. The heating of retorts was a highly scientific proposition; and many large coal-using industries had much to learn from modern gas-works in the conservation of fuel.

The question as to how they could realize the best value for their coke was very important. Its disposal was not always an easy matter, particularly in Chesterfield, situated in the heart of a district where coal was comparatively cheap, and there were coke-ovens. The Chesterfield Gas-Works had had to look round for means of either reducing their output of coke or finding fresh purchasers for the surplus production; and they solved the problem in 1921 by the introduction of plant to produce gas from coke and oil. He thought that the wisdom of the introduction of such plant had been shown in many ways. In the first place, it helped the consumer by cheapening production—in these times so essential. Secondly, it helped largely in controlling a regular calorific or heating value in the gas; and, thirdly, as the plant produced gas of a high flame-temperature when burnt, it greatly assisted the consumer in securing the best results with incandescent burners, gas-fires, &c.

Nowadays, said Mr. Davies, gas-works were primarily gaseous fuel producers, and the public generally recognized the great convenience of having "heat upon tap." The Chesterfield Gas Committee were now laying themselves out to provide opportunities for the public to purchase or hire modern apparatus of all descriptions for the economical use of gas. As 95 p.ct. of the gas sent out from works such as at Chesterfield was used for the heat it contained, he thought they need not worry themselves about consumers. Consumers had everything to gain and nothing to lose by the introduction of the new standard, which had been set-up entirely in the public interest.

CHEMICAL TRADE REPORT FOR 1922.

In their report on the chemical trade during 1922, Messrs. Sir S. W. Royse and Co., Ltd., of Manchester, make the following remarks under the heading of "Tar Products."

The abnormal condition of trade during the year has considerably affected this market: and values, with one or two exceptions, have gradually fallen. Prices of benzoles have declined from 2s. 7d. per gallon in January to 1s. 10d. to-day, in spite of reduced production through coke-ovens closing down, owing to the depression in the iron and steel trades. This may be accounted for largely by the further reduction in the price of petrol, which took place some two or three months ago. While the production of toluoles has been only small, the demand has been moderate. Solvent naphtha has been most erratic during the year. Buyers have only interested themselves in their immediate requirements, and prices have fallen from 2s. 7d. to 1s. 9d. per gallon. Creosote has maintained a fairly strong position throughout the year. There was a weakening in values during April, May, and June, and prices fell from 5½d. per gallon in January to 4½d. in May, since when the market has strengthened, and values have advanced to 6½d. per gallon; the demand from America, owing to the strike, having been one of the chief factors.

Though dehydrated tar has been in fair request, anticipations have not altogether been realized, due probably to the wave of economy which has passed over the country—local authorities restricting their expenditure on the upkeep of roads. After being without inquiry for the greater part of the year, carbolic acid during the last two months has shown some activity, and values are getting near a point at which makers will be more interested to produce. Prices for crude and crystals have ranged from 1s. 7d. per gallon and 6d. per pound respectively in January to 2s. 4d. and 8⅜d. at the present time. Naphthalenes have had a moderate inquiry during the year, the crude material having been more in demand than the refined; and values have been fairly steady at a low level.

In pitch, though prices at the commencement of the year were reasonable, the bulk of the business was for shipment; the fuel makers in South Wales having carried forward good quantities on old contracts. About the middle of the year South Wales secured some considerable business for briquettes, and a large quantity of pitch was bought; but the demand was only temporary, and latterly consumers in South Wales have not appeared anxious buyers. The inquiry for shipment has been heavy, and makers not holding stocks have found difficulty in keeping pace with it. Consequently the price has advanced. It remains to be seen whether the British briquette makers can compete at the high prices asked for pitch.

The inquiry for sulphate of ammonia has been fairly regular all the year, both the home and export markets having taken good quantities; and prices have been well maintained. The returns for January-November show 127,338 tons, as compared with 116,115 tons for 1921. The figures for the same period in 1913 were 295,930 tons.

Price of Gas at Walsall.—Substantial hopes of an immediate reduction in the price of gas were held out to consumers by an announcement which the Mayor (Mr. G. W. Warner) made at a meeting of the Walsall Town Council last week. As Chairman of the Gas Committee, he read a letter, in which the Manager stated that, after careful consideration of all the facts, he was fully convinced that the Committee could reduce the price to all consumers by 4d. per 1000 c.ft. The Committee, added the Mayor, had not arrived at any definite decision in regard to the matter, as they would prefer the Borough Treasurer first to have an opportunity of investigating the figures of the undertaking for the past nine months. They were, however, hopeful of being able to recommend a reduction of from 3d. to 6d. per 1000 c.ft.

THE NORTH-EAST COAST COAL TRADE.

From Our Own Correspondent.

In spite of having discussed little else during the past week, the market has not yet come to any definite opinion as to the probable outcome of the French advance into the Ruhr. That it will most likely have some effect, and not leave matters exactly as they are, is generally expected. But whether slump or boom conditions are likely to develop, no one can guess, and events have not yet shown.

There are several factors which may probably influence the market in some way or other. The German rate of exchange so far seems to have had no effect. In fact, the worse it became last year, the more orders seemed to come to Newcastle. On the other hand, if the French action in any way causes Germany to go entirely to pieces, we shall lose what at present is one of the best markets. If somehow or other Germany and German industry manage to go on as before under the French occupation, she will have to look to replacing the two million tons of last year's arrears which no doubt France will want, and this year naturally she will have to supply the full quantity due as reparations, or two millions more than last year. On the other hand, whoever gets these extra four millions may reasonably be expected to need less English coal. It is hardly conceivable that the French, who have always shown themselves experts at dealing with their own strikes, will permit the German coalfields to give up or slacken production, but whether by force they can keep the whole of a possibly very unwilling Germany at work remains to be seen. Depreciation in the franc and the lire, if it advances far, will probably have a serious effect on our exports to France and Italy. And then again, with a stranglehold on the German coalfields, and a determination to make Germany pay, will France and Italy be inclined to pay English prices? They have already bought fairly extensively for the year, but naturally nothing like the full quantity as yet that is counted on in a normal year. As it is, however, quite a feature of the past week has been the exceptional inquiry on this market for coal for France. The real meaning of this is difficult to see. The whole situation, it seems, must inevitably depend very largely on what is going to happen to Germany, and no one can tell yet whether she will live through or totally collapse. In any case there are still very large inquiries coming in for shipment to Germany over the whole year—and this with the French advance an accomplished fact. Up to the present, therefore, the whole affair has given rather a firming tendency than otherwise.

With the other factors mentioned last week still unaltered, with their books excellently filled for this quarter, and quite comfortably for the whole year, and with more business for prompt than they can satisfy, collieries are naturally inclined still to take an optimistic view of matters, in spite of the reparations crisis. What little coal they have available for the next month or so, they are inclined to hold and see what may "turn up" unless they can sell now at very top prices. For business over the whole year, the tendency is likewise inclined to be harder than otherwise. Wear Specials are holding firm for 24s. f.o.b. over the year, and best qualities of gas coal are hardly inclined to offer at all at present. The latter have been done at 24s. for shipment to Canada in April-May, with prospects of further business maturing for April-October. Specials are asking 25s. 6d. to 26s. for prompt or early shipment, and best qualities are holding firm for 25s., at any rate to the end of next month. Even at these prices, very little coal is available. Second-class gas qualities have done business up to 24s., and remain strong. The coking market holds firm, and 23s. 6d. has been paid for best quality Durham smalls for prompt shipment and for next month.

COAL TRADE IN THE MIDLANDS.

From a Local Correspondent.

In the Midlands negotiations are pending in a few cases for gas coal to meet requirements which were insufficiently covered by the half-yearly contracts. Generally speaking, current trade is very quiet. The consumption, which tends to decline as carbonization by vertical retorts is extended, has been below the estimate during the winter owing to the open weather. In December, there was an increased demand for gas for industrial purposes; and the improving tendency has been emphasized since the turn of the year. Where the industrial user is very considerable, the deficiency in the domestic branch has been more than balanced. There is no sign of shortage, however, and no indication that collieries will not be in a position to respond to any acceleration of demand between now and the time for fixing up new long-period contracts. It is expected that the gas undertakings will revert to the old plan of annual contracts. Some of them have not arranged for supplies beyond the end of April this year; and in their case it is considered probable that they will be willing to place their contracts up to June of 1924, so as to secure the uniformity of practice which obtained in pre-war days. The effect on prices of trade developments is being closely watched.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

The mild weather of last week was reflected in the coal trade of Yorkshire and Lancashire, household fuels of all descriptions being in small demand. The Yorkshire collieries, however, reported lack of stocks of these fuels. In both counties there were better inquiries for industrial fuel, although in Yorkshire the depressed state of several manufactures has its effect on the coal trade, and in Lancashire the cotton trade is not yet taking its full quantities of coal. Gas coals were everywhere firm, although this class of fuel is hardly in as good request for export as formerly, and values are rather easier. The export trade generally has improved owing to the European situation; Yorkshire having received some orders from France. Values are firm, 26s. per ton f.o.b. being firmly adhered to from forward business. In Lancashire the export trade in coke is very brisk, and prices are well maintained. The demand for washed fuel is good at 25s. per ton doubles and 23s. per ton singles, f.o.b. in each case. The output of

furnace coke is fully cleared, with late quotations still firm. Last week's prices included: Best South Yorkshire hards, 26s.; furnace coke, 29s.; dry doubles, 24s.; slack, 14s.; smalls, 12s. to 12s. 6d.; West Yorkshire Hartleys, 23s. (all f.o.b. Hull). Prices for export from Hull were: Yorks large screened steam f.o.b., 24s. 9d.; best Yorks hards, 26s. 3d. to 26s. 6d.; West Yorks Hartleys, 24s. 6d.; South Yorks washed doubles, 25s. 9d. to 26s.; gas coke, 30s. 6d. to 31s.; foundry furnace coke, 29s.

TRADE NOTES.

Horstmann Controllers.

The Horstmann Gear Company, Ltd., of Newbridge Works, Bath, will be exhibiting their gas controllers (Stand D 28) at the British Industries Fair, at the White City, Shepherd's Bush, from Feb. 19 to March 2, and not at Birmingham, as stated in last week's issue.

Argentine Government Contract for Valves.

Messrs. J. Blakeborough & Sons, Ltd., have recently secured a big contract for the supply of various sluice, disc, and reflux valves, and also a large number of fire hydrants, for the Argentine Government. It is interesting to note that this order was obtained in the face of both German and American competition.

Glover-West Vertical Retorts for York.

A contract has been placed by the York Gas Company with West's Gas Improvement Company, Ltd., for an installation of their Glover-West vertical retorts of the new model for a capacity of 2,500,000 c.ft. of gas per diem. The installation is to be completely equipped with waste-heat boilers and lip-bucket conveyors for handling coal and coke, and the contract includes the whole of the foundation and building work and the coke-storage hoppers.

Woodall-Duckham Retorts for the Hague.

The Hague Gas-Works have given an order to the Licensees of the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd. (Compagnie Générale de Construction de Fours, of 32 and 34, Rue de la Grange aux Belles, Paris), for the erection of an installation of Woodall-Duckham vertical retorts. The installation will consist of twenty-four 7-ton retorts, and will have a carbonizing capacity of 168 tons of coal per day.

Leatherhead Gas Capital Over-Subscribed.—The result of the issue of shares by the Leatherhead Gas and Lighting Company, which was recently announced in the advertising pages of the "JOURNAL," shows that public confidence in gas undertakings is well sustained. The 1000 £10 shares offered by tender at a minimum of £10 each were considerably over-subscribed, more than one-half of them at a premium.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 15.

There is but little business to report on the London market; makers being already well sold. Pitch maintains its strong position, and is probably worth about 135s. net per ton f.o.b. at producer's works. Creosote, also, is very firm at about 8¼d net in bulk at works. Motor benzole is slightly easier at 1s. 11d. net in bulk, or filled into buyers' drums. Other products are unchanged.

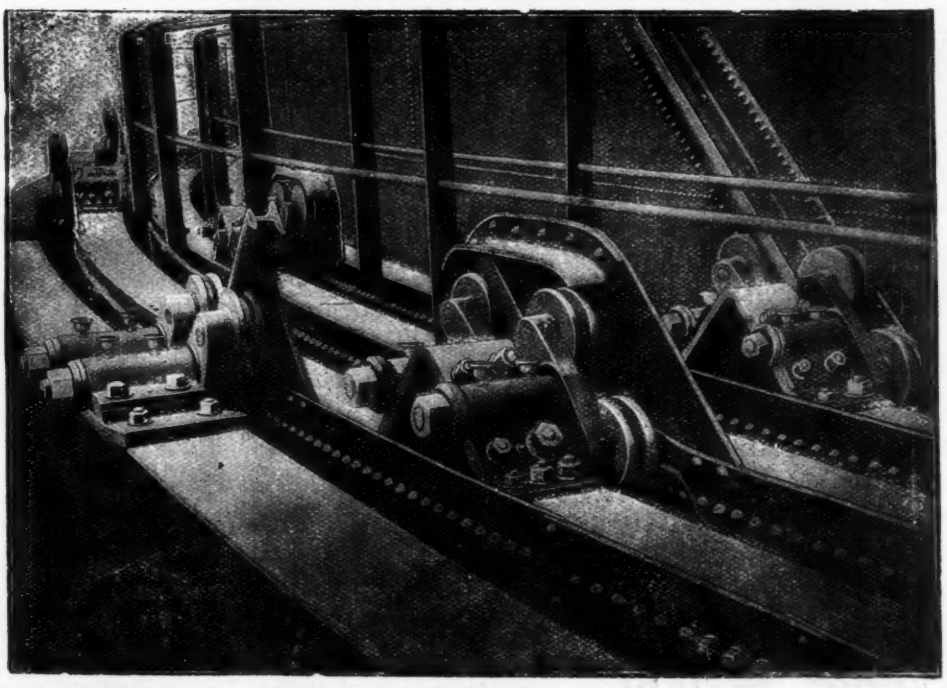
Tar Products in the Provinces.

Jan. 15.

The average values for gas-works products during last week were: Gas-works coal tar, 75s. to 80s. Pitch, East Coast, 127s. 6d. to 132s. 6d. f.o.b. West Coast—Manchester, 122s. 6d. to 127s. 6d.; Liverpool, 123s. 6d. to 128s. 6d.; Clyde, 127s. 6d. to 130s. Benzole 90 p.ct., North, 1s. 7½d. to 1s. 8d.; crude 65 p.ct. at 120° C., 1s. 0½d. to 1s. 1d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 8d. to 1s. 8½d. Toluole, naked, North, 1s. 11d. to 2s. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 1s. 6d. to 1s. 8d. Creosote, in bulk, North, liquid, 7½d. to 7¾d.; salty, 6⅞d. to 7d. Scotland, 6d to 6½d. Heavy oils, in bulk, North, 7d. to 7¼d. Carbolic acid, 60 p.ct., 2s. 5d. to 2s. 7d. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

*** We regret that in our market report last week the price of creosote was, through a typographical error, given "in bulk, North, liquid, 7½d. to 7⅞d." The ⅞ should have been ⅝. That a mistake had been made was perfectly obvious.

Gas-Workers' Wages at Aberdeen.—The Aberdeen Town Council have recently adopted a report by a Sub-Committee regarding wages of employees at the gas-works. The Sub-Committee met a deputation from the men, and discussed with them the alleged grievances. These were: (1) That the Aberdeen Gas-Works had been divided into two distinct zones and grades—shiftmen in Zone 1, Grade B, and daymen in Zone 3, Grade A; and (2) that this was not done by the Industrial Council (though upheld latterly by them), but was done locally. As the result of the explanations given and documents produced, the deputation appeared satisfied that they had no case on the points raised in their letters. At the same meeting, the question of a higher rate of wages for the labourers in the department was mooted; but the Sub-Committee pointed out that, as the wages of the men had been fixed under the recent zoning and grading scheme, they could not discuss the subject or enter on a comparison with other Corporation departments whose wages all along had been considered separately and apart from the gas-workers' wages.



THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

R. & J. DEMPSTER, LTD.,

London Office:
34, VICTORIA STREET,
WESTMINSTER, S.W. 1.

MANCHESTER.

Developments at Swadlincote.

The "Burton Observer" publishes half-a-dozen photographs depicting the plant and showrooms of the Swadlincote Urban District Council gas undertaking, and in one of these is included the Manager. In reproducing these pictures, the "Observer" says: "The present Manager (Mr. E. W. Wilson) has earned the greatest credit by the splendid manner in which he has reduced order out of chaos. The Swadlincote Gas-Works is now recognized to be one of the finest of its size in the country; and the ratepayers have every reason to be grateful for what has been done for them." According to the official handbook of the Swadlincote and District Chamber of Trade, "until 1898 the gas supply was in the hands of a private Company, but in that year the undertaking was purchased by the Urban District Council, and has since been greatly improved and extended. In 1921 the works were totally reconstructed and reorganized, and thereby rendered capable of coping with the increasing demand for gas."

Brechin Price again Reduced.—The Brechin Gas Company, Ltd., have again reduced the price of gas 5d. per 1000 c.ft., which makes the charge 5s. This is the second reduction in six months.

High-Pressure Main Fractured.—While Corporation workmen were re-surfacing Park Street, Walsall, on Friday last, an iron bar, which was being driven into the ground, fractured the high-pressure gas-main, the proximity of which apparently had been overlooked; and immediately there was a serious escape of gas. Efforts to stop the leakage were unsuccessful, but eventually the supply was cut-off.

Overdue Gas Accounts at Bradford.—Recently a thousand or more persons have been summoned at the Bradford Police Court for non-payment of rates, income-tax, and gas accounts. They all pleaded poverty, unemployment, &c.—though unemployment in Bradford has diminished greatly during the past year, and is now far less serious than in many industrial centres. Last week, on two separate days, batches of 300 gas account defaulters alone were dealt with; the amounts owing varying from 10s. to £5 or £6 in most cases, though two industrial firms owed nearly £70, and two others over £20. In most instances orders were made.

British Industries Fair (Birmingham Section).—The Duke of York will visit the Birmingham Section of the British Industries Fair, at Castle Bromwich, on Feb. 22. The Fair, which will be open from Feb. 19 to March 2, will be on the usual comprehensive lines. The stands will number about the same as last year; but the space occupied will be somewhat smaller, as some of the large firms have reduced the size of their displays. The chief features will again be engineering, brassfoundry, hardware, ironmongery, and metals—ferrous, non-ferrous, and alloys. In the hardware section there will be a display of products of Canadian manufacture, organized by the Canadian Chamber of Commerce. There will be, as last year, a very big display of gas, electrical, oil, steam, and other plant and apparatus.

Price Reductions at Kirkcaldy.—The Kirkcaldy Town Council have reduced the price of gas 6d. per 1000 c.ft. The rates now are: Ordinary consumers, 6s. 1d.; trade purposes, 5s. 5d.; and for the Thornton area, 6s. 11d.

Further Reduction at Devizes.—The price of gas has again been reduced at Devizes, this time by 5d. per 1000 c.ft., as from Oct. 1 last. This is the third reduction since April 1, 1922, making a total reduction of 1s. 9d. in six months.

Three London Gas Explosions.—On Monday, three gas explosions were reported in London; and unfortunately one of them resulted in injuries which necessitated the removal of two men to hospital. This occurred at a flat in Cranworth Gardens, Brixton, where the occupier and a friend, on returning from a party, were seriously hurt by an explosion which followed the striking of a match to light the gas. At a draper's shop in Lordship Lane, East Dulwich, escaping gas had entered a room, and an explosion occurred while a plumber was repairing a gas-pipe. The plate-glass shop window was smashed. In the third case, at the Circus Café, Great Titchfield Street, W., a customer was struck by flying glass, and some damage was done to the premises, by an explosion of gas.

The Letterkenny (Donegal) Urban Council have reduced the price of gas from 12s. 6d. to 10s. per 1000 c.ft.

For gas-works extensions, the Burton-on-Trent Corporation are applying to the Ministry of Health for sanction to borrow £36,100.

It is recommended by the Burnley Corporation Gas Committee that the Ministry of Health be asked to sanction the borrowing of a sum of £45,000, for a gasholder and connecting mains.

The Knaresborough Urban District Council are applying to the Ministry of Health for power to borrow £20,000 for reconstruction work in the gas department, though it is not proposed to spend more than £10,000 at present.

While engaged working at a manhole in connection with the Wimbledon Corporation electric light system, two of the department's employees received serious burns about the hands and head through an explosion of gas which had accumulated at the manhole.

At an auction sale last week, two ordinary shares of £10 each, fully paid, in the Rossendale Union Gas Company sold for £15 5s. each; ten 7 p.ct. shares for £11 10s. each and ten £11 7s. 6d. each; 25 1876 Act shares, £2 called up and £8 paid in advance of call, for £11 5s. each; and nine 5 p.ct. preference shares (£6 per share paid) for £6 12s. 6d. each.

The Surveyor has reported to the Stone Urban Council that gas liquor has been run into the Council's sewer from the Stone Gas-Works, causing damage to the filters, &c., at the sewage works. The Clerk was instructed to write to the Stone Gas Company stating that, unless the practice was stopped forthwith, the Council would take measures to obtain an injunction and recover damages.

CALORIFIC POWER AT A GLANCE.

Alexander Wright
& CO., LTD.,
WESTMINSTER, S.W.1.
SOLE LICENSEES.

STOCK MARKET REPORT.

THE Stock Exchange has had a better week than might have been expected, seeing the crucial problems, both Home and International, which beset us, and most of the leading markets kept their ends up pretty well. Gilt-edged were conspicuous. Home Government issues were higher, and on Friday the big four marked: Consols 55⅞-56¼, War Loan 100½-100¾, Funding 86⅝ 87⅜, Victory 89½-89½. Indians and Colonials were in good demand. Home Rails held on well, and Canadians were steady. The Foreign Market was shaky at first, but rallied later on.

Business in the Gas Market was a replica of the week before in point of activity, and again Gas Lights and Primitivas had the lion's share of it. The tendency was good, with several rises in price and only two or three lowerings. Alliance and Dublin debenture rose 2, British 1, ditto preference ⅜, Continental Union preference 1, Newcastle 5½, South Metropolitan preference 1½, ditto 3 p.ct. debenture ½. Gas Light ordinary fell ½, Imperial Continental 2, and European ½.

[In last week's report, line 9, *for* "breakfast" *read* "break-down."]

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	68—73	..
1,551,868	,,	Oct. 5	2½	5%	Alliance & Dublin Ord.	59—64	62—67	64—64⅞
374,000	,,	Jan. 11	4	4%	Do. 4 p.c. Deb.	76—79	60—65*	...
280,000	5	Oct. 19	7½	4/-	Bombay, Ltd.	5½—6½	4½—5	91/3—93/9
100,000	5	Aug. 10	16	7½%	Bourne- mouth Gas and Water { 5 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	..	11—12	...
383,110	10	,,	7	7%		15—15½	11—12	11½—11½
115,000	10	,,	6	6%		13½—14	9—10	...
162,065	—	Dec. 29	—	4%		..	71—76	...
992,045	Stk.	July 27	14	61/-	Brentford A Consolid.	261—266	100—103	...
734,920	,,	,,	11	61/3	Do. B New	204—209	100—103	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	Dec. 14	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Aug. 24	11	11½%	Brighton & Hove Orig.	208—213	163—170	...
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	120—125	123½—124
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	89—91	...
530,000	20	Oct. 5	12½	22/6	British	44—45	34—35	34½
10,000	10	Dec. 29	—	7/-	Do. 7 p.c. Pref.	..	91—10½	10½—11½
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
245,771	,,	Dec. 29	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	Nov. 2	—	—	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Oct. 19	—	—	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	Dec. 29	4½	—	Do. 4½ p.c. Deb. Stk.	70—75	71—76	...
237,850	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	102—104	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	93—98	96—96½
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	93—98	...
475,000	,,	Dec. 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	53—60	57½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	26—31	...
200,000	,,	Dec. 14	7	3%	Do. 7 p.c. Pref.	115—118	53—60	55—58
660,000		Sept. 1	—	6%	Croydon sliding scale.	..	96—101	...
284,975		,,	—	5%	Do. max. div.	..	80—85	84
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
209,003	,,	Oct. 5	—	5%	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	9—10	9—9½
16,298,975	Stk.	July 27	4/17/4	52/-	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds 7½ p.c. Ilford Deb.	98—102	93½—95½	93½—95
2,600,000	,,	,,	3½	35/-		76—79	62—65	63½—64½
4,062,235	,,	,,	4	4%		96—99	76—81	77½—79
4,674,850	,,	Dec. 14	3	3%		72½—74½	59—62	60—63
130,000	,,	Dec. 11	10	10%		..	..	...
—	—	—	—	—		..	..	...
82,500	,,	Sept. 21	5	65/7½	Hastings & St. L. 5 p.c.	..	95—100	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	77—80	..
70,000	10	May 18	11	7½%	Hongkong & China, Ltd.	16½—16½	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c.	..	127—132	...
1,976,000	,,	Nov. 16	9	5%	Imperial Continental	150—160	155—160	155—160
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	77—82	79—80½
235,242	,,	July 27	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	..	...
600,000	,,	Sept. 21	—	7%	,, 7 p.c. Pref.	..	105—107	...
165,736	,,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	Dec. 29	—	3%	Do. 3 p.c. Deb	..	53—58	...
75,000	5	June 29	6	6%	Malta & Mediterranean	4½—4½	3½—4	...
250,000	100	Oct. 2	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	97—100	...
541,920	Stk.	Nov. 30	4	4%	Monte Video, Ltd.	11½—12	55—60	..
1,875,892	,,	July 27	4½	4½%	Newcastle & Gatsh'd Con.	98½—99½	83—83½	83—83½
98,125	,,	,,	—	4%	Do. 4 p.c. Pref. Stk.	..	66—69	...
329,705	,,	Dec. 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	63—68	..
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	..	...
55,940	10	Aug. 24	7/14/0	7/8⅞	,, ,, 7 p.c.	14—15	10½—11½	...
300,000	Stk.	Nov. 30	8	8%	Oriental, Ltd.	117—122	95—100	...
188,120	Stk.	Dec. 29	—	72/6	Plym'th & Stonh'se 5 p.c.	..	91—96	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B	128—131	100—105	...
100,000	50	,,	12	60/-	Do. C	118—121	85—90	...
249,980	5	—	8	—	Primitiva Ord.	5½—6	1⅛—1⅜	13/6—13/9
499,960	5	—	5	—	Do. 5 p.c. Pref	4½—5	2½—2⅝	50/7½—53/6
521,600	100	Nov. 30	4	4%	Do. 4 p.c. Deb.	91—93	68—73	70½—71
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	Dec. 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	..
150,000	10	Sept. 21	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½—11	5½—6½	...
125,000	50	July 3	5	5%		47—49	35—38	...
135,000	Stk.	Aug. 24	10	5%	Sheffield A	223—224	97—99	...
209,984	,,	,,	10	5%	Do. B	222—224	97—99	...
525,500	,,	,,	10	5%	Do. C	220—222	97—99	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	Nov. 2	9	7%	South African	10½—11½	7—9	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	93½—95½	94½—95½
250,000	,,	Jan. 11	—	5%	Do. Red. Pref.	..	94—9⅞*	..
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	58—61*	59—61½
734,000	,,	Sept. 7	—	6½%	Do. 6½ p.c. Deb.	..	105—107	105½
224,820	,,	Aug. 24	8½	8½%	South Shields Con. Stk.	157—159	108—110	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100	97½—98½
298,337	,,	Dec. 29	5	5%	Do. 5 p.c. Deb. Stk.	116—118	93—98	95½
647,740	,,	Nov. 2	5	7%	Southampton Ord.	99—102	80—83	...
121,275	,,	Dec. 29	4	4%	Do. 4 p.c. Deb. Stk.	..	68—73	...
250,000	,,	Aug. 24	—	21 8	Swansea 7 p.c. Pref. Stk.	..	103—105	...
200,000	,,	Dec. 29	—	20 2	Do. 6½ p.c. Deb. Stk.	..	101—103	...
120,000	,,	July 27	—	7½%	Tottenham District { A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	112—117	...
782,275	,,	,,	6	6%		115—117	100—103	...
181,255	,,	Dec. 14	4	4%		87—89	75—80	...
236,476	Stk.	Aug. 24	5	2½%	Tynemouth 5 p.c. max.	108½—109	79—81	...
30,000	,,	July 27	8½	72/6	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	111—115	...
855,636	,,	,,	6½	57/6	Do. B 3½ p.c.	129—134	95—100	...
128,075	,,	,,	—	50/9	Do. C.	..	87—92	...
140,865	,,	,,	—	50/9	New Ordinary	..	87—92	...
352,000	,,	,,	6½	53/9	Wimbledon 5 p.c.	117—122	95—100	97
98,000	,,	,,	6½	58/9	Epsom 5 p.c.	121—126	95—100	...
88,416	,,	Dec. 29	3	3%	3 p.c Deb. Stk.	66—69	56—59	...

* Ex Div.

The following transactions in gas were recorded during the week: On Monday, Continental Union 7 p.ct. preference 57½, Croydon maximum dividend 84, European 9½, Gas Light ordinary 93⅜, 94, 94⅛, 94⅜, 94½, 94⅝, 94¾, ditto 3½ p.ct. maximum 63⅜, ditto 4 p.ct. preference 78, ditto 3 p.ct. debenture 60, 61, 61½, Imperial Continental 159, 159½, 160, Primitiva 13s. 6d., ditto 5 p.ct. preference 50s. 7½d., 51s. 3d., 52s., 52s. 3d., 52s. 6d., South Metropolitan 94½, 94⅜, 95, 95⅛, 95¼, 95⅜, ditto 6½ p.ct. debenture 105½, South Suburban 98½, Wandsworth Wimbledon 97. On Tuesday, Bombay 93s. 9d., Continental Union 7 p.ct. preference 55, 58, European 9½, Gas Light ordinary 94, 94⅛, 94⅜, 94¾, ditto 3½ p.ct. maximum 64, 64⅛, ditto 4 p.ct. preference 77⅜, 78⅛, Imperial Continental 159, 160, Primitiva 5 p.ct. preference 52s. 6d., 53s. 1½d., South Metropolitan 3 p.ct. debenture 59. On Wednesday, Alliance and Dublin 64, Continental Union 7 p.ct. preference 55, European 9, 9⅛, 9⅜, Gas Light ordinary 94, 94⅛, ditto 4 p.ct. preference 77⅛, 78, 78⅛, ditto 3 p.ct. debenture 60⅛, 61, 63, Imperial Continental 158, 159, ditto 3½ p.ct. debenture 79, Primitiva 13s. 6d., ditto 5 p.ct. preference 51s. 10½d., 53s. 9d., ditto 4 p.ct. debenture 70⅜, 71, South Metropolitan 94⅛, 94⅛, ditto 3 p.ct. debenture 61⅛, South Suburban 97½. On Thursday, British 34⅛, Commercial 4 p.ct. 96½, European 9, Gas Light ordinary 93⅜, 94, 94⅛, 94⅜, 94⅜, 94⅞, 95, ditto 3½ p.ct. maximum 64, ditto 4 p.ct. preference 78, 78⅛, 79, Imperial Continental 157, 158, ditto 3½ p.ct. debenture 80⅛. Primitiva 5 p.ct preference 51s. 3d., 51s. 6d., 52s. 6d., 52s. 9d., South Metropolitan 94⅜, 95, Harrow and Stanmore 5 p.ct. 82⅛, Wolverhampton 10 p.ct. 125½, ditto 6 p.ct. preference 78, Newcastle 83, 83½. On Friday, Alliance and Dublin 64⅞, Bombay 91s. 3d., Bournemouth "B" 11⅛, 11⅜, Brighton and Hove "A" 123½, 124, British 34⅛, Commercial 4 p.ct. 96, ditto 3 p.ct debenture 57⅛, Gas Light ordinary 94, 94⅛, 94⅜, 94⅜, ditto 3½ p.ct. maximum 63⅛, 64⅛, Imperial Continental 155, 156, 156½, and "specials" 175, Primitiva 13s. 6d., 13s. 9d., ditto 5 p.ct. preference 50s. 7½d., 52s. 6d., 53s., 53s. 6d., South Metropolitan 94⅛, 95, South Suburban 5 p.ct. debenture 95⅛, Lea Bridge 5 p.ct. preference 90½.

In the Money Market, at the opening of the week the position was quite comfortable in view of the abundant supply; but ere long rates became firmer, and by Thursday there was a considerable demand. This, however, was met without much difficulty, and ease continued till the close. Discount rates ruled fairly steady. Silver fluctuated according as the Eastern demand varied, and the closing price showed a moderate fall from Monday's figure. The Bank of England rate was 3 p.ct., as fixed on July 13.

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Continued on p. 160.